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THE CONTRIBUTIONS OF PHYSIOLOGY TO SURGERY, 1905-1955

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THE remarkable progress in the science and practice of surgery during the past fifty years is largely due to a better understanding of physiological principles by surgeons and to an accompanying progress in the science of physiology itself. In this latter effort, it is gratifying to note that practicing surgeons have taken their places along with the professional physiologists, biochemists, and pharmacologists in helping to solve fundamental biological problems. This is true particularly of surgeons in the larger teaching hospitals. In their contributions they have securely established the technique of surgery as a valid and valuable method for fundamental scientific research. This effort, largely initiated by Pavlov in his study of the physiology of the digestive secretions, has been extended widely to other areas. The successful applications of present day information concerning the regulation of the blood pressure, the exchange of gases in the lungs and tissues, and the maintenance of a constant chemical and physical structure of the blood and body fluids have all convinced the surgeon that only in this way can the extensive surgical procedures of the present day be safely carried out. Appreciation of the practical value of this new knowledge has stimulated many surgeons to attack fundamental physiological problems in the hope that further progress may result. This attention to the problems of organ and system physiology by clinicians has helped to compensate for the loss of interest in these fields by the physiologists whose interest and attention seems more and more to be drawn to problems in biophysics, surface membrane phenomena, and the internal machinery of cells.

Surgery shares a common body of knowledge and method with the field of general medicine, but is distinguished in that the operative attack upon disease is its special province. No specialty is isolated from all the rest except insofar as its own members ignore related fields. For this reason the contribution of any basic science to a medical specialty and of physiology to surgery in particular is not to that one specialty alone, but it ramifies with varying degrees of impact throughout clinical medicine. Although surgery thus shares advantages of increased understanding of physiological processes with other fields, it has been influenced in certain areas by physiological contributions in the last half century.

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The foundations underlying modern surgery lie in biological science, the basic unity of which has become obscured in these latter days in part by subdivision into such compartments as anatomy, pathology, microbiology, and physiology. Each of these has had its special influence which has reached a peak at some particular era. Thus, the flowering of pathology under the influence of Virchow and his contemporaries had great significance in improving surgical practice and understanding in the latter part of the nineteenth century. Once such a contribution has been made, it is not forgotten, but becomes an integral part of the body of surgical knowledge upon which newer insights are based. It is thus probably a necessary sequence that the major contributions from anatomy, bacteriology, and pathology precede those of physiology.

Physiology is the branch of biological science dealing with the function of living things. As Jennings (61) has said, "An animal is something that happens." Although anatomy and pathology have lately become more dynamic in outlook, physiology, pharmacology, and biochemistry hold the study of biological events as their very essence. The last three are only imperfectly separable on the basis of their differing investigative methods. They are coincident because of the identity of their approach and subject matter, so that any attempt at rigid segregation, one from the other, is artificial and valueless.

The last half of the nineteenth century produced a remarkable development in physiology, characterized by the activity of numerous European investigators and groups (15). Men like Carl Ludwig (1816–95), Claude Bernard (1813–78), and I. P. Pavlov (1849–1936) applied experimental methods in a sustained manner in their chosen areas to produce numerous discoveries and to allow deeper understanding, new theories, and more experiments to stem from them. This expansion of physiology has continued unabated to the present.

Surgery, also breaking into new activity since the introduction of anesthesia and asepsis, was ready by 1900 to be influenced to its great benefit by the new discoveries in physiology. Perhaps the most important reason for the continued advance of surgery during the past 50 years has been the incorporation of physiological thinking and knowledge into surgical practice. This has permitted better care for the patient before and after operation, improved understanding of indications for operation, and the use of new or improved procedures based on physiological considerations.

At the same time these 50 years have seen another salutary trend which is likely to continue. Surgeons, stimulated by their special opportunities or by the unsatisfactory state of many clinical problems, have turned to fundamental physiological investigations in the laboratory and in the clinics on patients. Such research has often yielded fundamental results that represent a solid contribution to the science of physiology. In at least several ways the surgeon has particular advantages for physiological research. He has special manual skills, fitting him for the difficult operative problems which often arise in the successful conduct of mammalian experiments. He sees patients and, hence, has readily at hand both the problems and the people which are the necessary basis for a study of human physiology. Finally, he operates upon patients, producing known changes in structure which may allow fruitful studies of resulting alterations in function. Thus, physiology and surgery now lie on a two way street and the contributions to scientific knowledge flow both ways.

A survey of some of the more important areas where physiology has influenced surgery and where surgeons have in turn made significant contributions to physiology will illustrate the significance of this intercourse.

In terms of the extent of the contribution and degree of its incorporation into surgical practice, no field surpasses that of the physiology of the digestive system. Pavlov's "The Work of the Digestive Glands" (55) summarized his extensive studies utilizing accessory stomach pouches in dogs. He demonstrated that a secretion of gastric juice occurs as a result of impulses in the vagus nerves aroused reflexly by the sight, or odor, or taste of food. The abolition of this secretion after division of the vagus nerves established the vagi as the important secretory nerves to the stomach. Subsequently, he and his associates went on to demonstrate that this nervous stimulation of gastric secretion may become a conditioned reflex. The recent discovery that a hypersecretion of gastric juice occurs in the fasting stomach of duodenal ulcer patients of a degree which if reproduced in experimental animals regularly causes the production of ulcers, and the finding that this hypersecretion is abolished by dividing the vagus nerves to the stomach, have all provided strong

support for the concept that duodenal ulcer in man is a psychosomatic disease. Presumably the tensions and strains of modern life in some way produce a secretory hypertonus in the vagus nerves. The methods of Heidenhain and Pavlov have been widely and fruitfully used in the continuing study of digestive secretions.

Walter B. Cannon (11) introduced the use of the radiopaque meal with bismuth subnitrate and roentgen rays in the study of gastric and intestinal peristalsis on a fluoroscopic screen. He and A. J. Carlson (14) independently demonstrated that the sensation of hunger is of peripheral origin and that hunger pangs are produced by strong contractions of the empty stomach. Bulatao and Carlson (9) found that hunger contractions in dogs may be produced by insulin-induced hypoglycemia and inhibited by the intravenous administration of glucose. Similar observations by Labarre (43) were made concerning the gastric secretion of hydrochloric acid and form the basis for the so-called insulin test to determine the presence or absence of vagus innervation to the stomach.

The humoral phase of gastric secretion was established by the work of Ivy and his associates who demonstrated that an accessory stomach pouch transplanted to the abdominal wall and devoid of all nervous connections with the alimentary tract would secrete acid gastric juice on the ingestion of food. The postulate of Edkins (26) that this humoral agent, gastrin, has its origin in the antrum of the stomach was established by the work of Dragstedt and his associates who found that removal of the antrum practically abolishes gastric secretion in Heidenhain pouches and that the transplantation of the antrum to the colon as a diverticulum produces a sustained hypersecretion of gastric juice even leading to ulcer formation. Recognition of the antrum of the stomach as a specific endocrine organ for the manufacture and release of the specific secretory stimulant has led to renewed interest in this phase of gastric secretion and its role in the ulcer problem. Dragstedt has advanced the concept that duodenal ulcers are usually due to a hypersecretion of gastric juice of nervous origin, and gastric ulcers are usually due to a hypersecretion of humoral or gastrin origin.

Exalto, Mann and Williamson (47) initiated the experimental study of peptic ulcer in animals by their demonstration that ulcers consistently develop if the neutralizing alkaline juices of the duodenum are diverted into the lower ileum. A more important experiment from the standpoint of the clinical problem was performed by Wangensteen and his associates (62) when they demonstrated that peptic ulcers are regularly produced in experimental animals when a continuous hypersecretion of gastric juice is induced by the subcutaneous implantation of pellets of histamine in beeswax. It seems likely that hypersecretion rather than defective neutralization is the more common problem in human ulcers.

Among the more important physiological contributions to our knowledge of the liver are the extensive studies on the hepatectomized dog by F. C. Mann and his associates (48). These workers devised methods for preparing liverless dogs without the acute portal vein obstruction, which previously had been rapidly fatal. These hepatectomized dogs died with convulsions from hypoglycemia, but could be protected dramatically by the intravenous administration of glucose, thus demonstrating the importance of liver glycogen in maintaining the normal concentration of the blood sugar. After hepatectomy, bilirubin and amino acids accumulated in the blood and urea formation stopped. Of especial importance to surgeons was the development of the determination of prothrombin in the blood by Quick (56) and the finding that prothrombin deficiency is responsible for the bleeding tendency in jaundice by Whipple. The discovery of vitamin K as the element lacking in a hemorrhagic disease of chicks by Dam (21) and in prothrombin deficiency in man led to its use to correct this deficiency and to the introduction of the prothrombin time as a liver function test (2) by Allen and Julian.

A great deal of our knowledge concerning the extrahepatic biliary ducts has come from surgeons or from the use of surgical methods. Rous and McMaster (58) devised a method for the long term collection of bile, and in these experiments demonstrated the concentrating function of the gallbladder. Graham and Cole (32) discovered cholecystography and by this means confirmed the concentrating function of the gallbladder mucosa and established a practical method for the demonstration of gallbladder pathology. More recently Mallet-Guy and his associates (45) have studied operative cholangiograms and intraductal pressures as a means of diagnosing disturbances in the sphincter of Oddi in man.

Pavlov and his pupils demonstrated that diversion of the portal blood from the liver into the vena cava by the fistula method of von Eck(25) could be accomplished without serious consequences. However, occasionally metabolic alterations, including the systemic intoxication from eating meat, the inability to manufacture proteins normally as shown by George Whipple (66), and the diminished regenerative ability of the liver (18), may occur. Some of these defects are present in patients with cirrhosis and portal hypertension, and after portacaval shunting procedures. The recent development of the latter procedure for portal hypertension has permitted direct measurement of the portal pressures and the effects of shunts in man with cirrhosis. On the arterial side, thorough excision of the hepatic artery in the dog was shown to be fatal by Haberer (34) and others, but recently Markowitz and his coworkers (50) have found that antibiotics offer protection in a spectacular fashion, preventing the massive overgrowth of anaerobic bacteria which may occur after hepatic artery ligation. These studies confirm the conclusions of Dragstedt and Ellis that death from in vivo autolysis of the liver in dogs is usually due to a toxemia of bacterial origin.

Studies on the external secretion of the pancreas have been of especial interest to surgeons because of the serious hazards of pancreatic fistulas. Bayliss and Starling (5) demonstrated that the secretion of pancreatic juice is stimulated by the release of a chemical agent from the duodenal mucosa on contact with the acid content from the stomach. This agent, which they called pancreatic secretin, was the first of the internal secretions, or hormones, to be clearly demonstrated. The reduction of acid reaching the duodenum to minimize pancreatic secretion has become an important factor in the therapy of acute pancreatitis. The collection of external pancreatic secretion has required the surgical preparation of an external pancreatic fistula, such as that of Elman and McCaughan (27), Dragstedt and Ellis, and Routley and his associates (59). It has been demonstrated that dogs with a total pancreatic fistula die in a few days from large losses of water and salts and uncompensated acidosis. Vagotomy has little effect on the total volume of the pancreatic juice secreted. The digestive and metabolic abnormalities resulting from pancreatic duct ligation or pancreatectomy have been studied by Dragstedt (24) and by Chaikoff and his associates (16). Depancreatized dogs, treated only with insulin, develop a progressive cachexia, hypolipemia, hepatomegaly, and impairment of liver function, and eventually die in from 3 to 6 months. These changes may be prevented, or relieved after they have developed, by the oral administration of raw pancreas or of fat-free alcohol extracts of pancreas. They are partially corrected by the oral administration of large doses of choline, methionine, or high protein fat-free diets. The beneficial effect of pancreas feeding in this connection appears to be due to a specific substance, lipocaic, not found in other tissues, such as the liver, brain, or salivary glands. A deficit in the digestion of protein and fat has also been found after pancreatectomy in man and is only partially corrected by the oral administration of pancreatin (16, 22). Numerous physiological studies have been directed at elucidating the mechanisms leading to acute pancreatitis or acute pancreatic necrosis. The common channel theory of Opie has recently received renewed support in the demonstration by Doubilet and Mulholland (23) that in many patients with recurrent attacks of acute pancreatitis a common channel is demonstrable by cholangiographic methods. These and other contributions have led to sphincterotomy or elimination of the common channel as a logical procedure for recurrent pancreatitis.

The cause of death in acute intestinal obstruction has engaged the attention of many surgeon physiologists during the past half century. It is apparent that death resulting from simple obstruction in the upper part of the gastrointestinal tract may be adequately accounted for on the basis of failure of resorption of the water and salts poured out in the gastric and pancreatic secretions. This is due to the fact that these glands have the unique capacity of continuing to separate the sodium and chloride ions necessary for their secretion from the blood plasma, until these elements become so deficient in the blood that life cannot exist. In lower obstructions with vascular damage to the intestine, there is often also a loss of protein from the vascular space so that shocklike symptoms supervene. When severe damage to the mucous membrane of the intestine has taken place and its protective capacity of selective absorption is abolished, a toxemia, due to the absorption of poisonous bacterial products from the lumen of the intestine, occurs. The use of antibiotics in experimental

intestinal obstruction of various types has established the importance of this factor in strangulation obstruction. Distention of the intestine, either of mechanical or functional origin, has been recognized as of great importance, and, for this, decompression by intragastric suction as introduced by Wangensteen (64) has proved to be invaluable.

Perhaps physiological thinking has benefited surgical practice more in the field of electrolyte and water metabolism than in any other. Claude Bernard developed the concept of the relative constancy of the internal environment, the interstitial fluid in which all living cells are bathed (6). This constancy is maintained by numerous body mechanisms, particularly at the lungs and kidneys, and these homeostatic adjustments were summarized by Cannon (12). In an effort to assist the body in accomplishing these adjustments, the modern surgeon makes use of appropriate fluid and salt administration based on frequent chemical determinations of the serum electrolytes and water balance. The importance of the failure of resorption of the sodium and chloride of the gastric juice in high obstruction was demonstrated by Gamble and his associates and the value of parenteral administration of saline solution in the treatment of experimental obstruction was shown earlier by Hartwell and Hoquet (35). More recently the possible dangers of potassium deficiency have been emphasized (53), and the administration of potassium chloride has been found specific for hypokalemic alkalosis refractory to sodium chloride administration (53).

There has been a growing recognition among surgeons of the importance of adequate nutrition. Plasma protein and hemoglobin formation were studied by George Whipple (65) in dogs depleted in a standard manner, and a rich protein diet was found necessary for the best regeneration. Liver was the best of the protein foods, and infection, liver damage, or the formation of a biliary or an Eck fistula all impaired this regeneration. Paul Cannon and his associates have clarified the necessity for adequate protein intake for antibody production, and of adequate essential amino acids and potassium for tissue protein synthesis (10). On the basis of such work, a good intake of protein and of vitamin C is recognized as essential for optimal wound healing; and deficiencies may give rise to postoperative nutritional edema (40), liver damage in the presence of noxious agents, and delayed wound healing (57).

The cause of surgical shock is of continuing interest to surgeons. The earlier hypotheses that shock is due to exhaustion of the vasomotor centers or to toxins liberated at the site of injury (13) have been superseded by an appreciation of the dominant role of blood and plasma loss since the animal experiments of Blalock (7) and Phemister (54). Fine and his coworkers (28) have demonstrated that perfusing the liver with arterial blood prevents the irreversible phase of hemorrhagic shock in dogs. This may be due to the vasodepressor substance produced by the liver during circulatory impairment, according to Zweifach and Shorr (60). More recently the bacteriological and toxic origin of irreversible shock has been demonstrated (29) and antibiotics were found to be of value. An increased susceptibility to shock has been recognized as a characteristic of patients whose condition reveals chronic malnutrition and a reduced blood volume (19).

On the basis of the findings outlined, the liberal use of whole blood and plasma is desirable, but this required the concomitant discoveries of the blood groups by Landsteiner, Jansky, and Moss, and of the use of sodium citrate as an anticoagulant by Hustin and Lewisohn to make it practical (42). Increased safety in the transfusion of blood has come with the recognition of the Rh factor by Wiener (67). Improved techniques of blood volume determinations, such as the use of the dye T1824 by Gregerson (33) and of radioactively labeled red cells (51), have permitted extensive studies on deficits of the blood volume, which have contributed to the recognition of the importance of blood replacement.

Anticoagulant therapy for venous thrombosis is based on fundamental findings concerning the mechanism of blood coagulation. These include the recognition of heparin as a highly active anticoagulant (38) and the discovery of dicumarol as a reliable and controllable substance for reducing the prothrombin of the blood (44). Subsequently, the use of heparin has been made safer, and some bleeding states have been controlled by the administration of protamine (41) or toluidine blue which neutralizes heparin in vivo.

Advances in endocrinology have often depended on surgical experiments on animals. A

striking example is the production of diabetes in the dog by extirpation of the pancreas by von Mering and Minkowski (52). The subsequent demonstration of insulin in the pancreas by Banting and Best (4) was accomplished by using extracts of degenerated dog pancreas prepared 8 to 10 weeks after ligation of the pancreatic ducts. The finding of Houssay that hypophysectomy in the dog alleviates the diabetes following pancreatectomy (37) illustrates the complexity of the endocrine control of carbohydrate metabolism.

Surgery for hyperthyroidism is indebted to physiological study of the regulation by thyroid of the basal metabolic rate (8), of the role of iodine in the prevention of goiter (49) and in alleviating thyrotoxicosis, and of the newer antithyroid drugs, such as thiouracil (3). The introduction of radioactive iodine has offered a supplementary method for the diagnosis and treatment of hyperthyroidism (17). Surgery for hyperparathyroidism came into its own following the isolation of parathormone by Collip (20), the demonstration that von Recklinghausen's disease of bone can be cured by excision of the parathyroid adenoma (46), and the continued metabolic studies in this field by Albright and his associates (1).

Extirpation of the adrenal glands with satisfactory survival has become possible only recently because of the availability of the hormones from the adrenal cortex and the appropriate administration of salt. This has permitted further exploration with reduced hazard of adrenalectomy for Cushing's syndrome (63), hypertension, and metastatic cancer of the breast (39). The diagnosis and surgical treatment of pheochromocytomas have been revolutionized by the introduction of pharmacological agents such as benzodioxane and dibenamine which counteract the effects of circulating epinephrine (31). These examples, drawn from the field of general surgery, represent only an infinitesimal fraction of the body of physiological knowledge bearing on surgery today. To comprehend the truth of this, one has only to contemplate: the studies of Heymans on control of the circulation by pressor and chemoreceptors (36), the contributions to our knowledge of circulatory dynamics using catheterization techniques, the improved understanding of the physiology of the open chest, studies on the effects of sympathectomy in hypertension, peripheral vascular insufficiency and causalgia, and investigations of renal function. The surgeon's daily thinking, whether or not he is consciously aware of it, utilizes a physiological heritage of great scope of which the instances that are given by the author are but a bare suggestion.

Physiological advances have held a pre-eminent place in the development of surgery in the last 50 years. They will continue to increase in importance. Surgeons, in their turn, have participated in fundamental physiological work, particularly in the sections of mammalian organ physiology amenable to surgical techniques of investigation. New operations have developed, based on physiological principles, for peptic ulcers, hypertension, prostatic cancer, cardiac anomalies, and other diseases. The surgeon, faced as he is with sick patients and their problems, owes a great debt to physiology in the management of his patients and simultaneously has an opportunity to contribute to physiological knowledge.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

EYE

Lid Mobilization and Tarsorrhaphy for Massive Proptosis. SAMUEL GARTNER and MAX CHAMLIN. *Arch. Ophth.*, Chic., 1954, 52: 234.

IN CASES of massive proptosis due to neoplastic or thyroid disease, the usual types of tarsorraphy are often inadequate to afford proper protection of the globe. In such cases the authors find that satisfactory approximation of the lid edges can be secured by cutting the external canthal ligament and undermining the lateral portions of both lids, especially the lower.

The procedure is well illustrated and 3 cases with neoplastic orbital disease, in which this method proved entirely adequate, are described.

—*James E. Lebensohn, M.D.*

Intraocular Foreign Bodies; Report of 102 Cases. KAZIMIREZ RUBINSTEIN. *Brit. J. Ophth.*, 1954, 38: 369.

AN intraocular foreign body is a surgical emergency and it is important to keep operative procedures simple; however, there is no universally accepted best method of treatment apart from the extraction of the foreign body from the globe, when possible. Controversial points in treatment are the anterior or posterior route of extraction, diathermy of the scleral field, or simple incision and the type of magnet that is preferable.

The author mentions recent reports on the management of intraocular foreign bodies, the material concerned being mostly World War II cases.

The present study consists of 102 consecutive cases seen from 1944 to 1953. The criterion for inclusion in this series was that the foreign body should have penetrated the eye, and hopelessly lacerated eyes were included only if the foreign body was lodged within the globe.

All cases were treated according to the same surgical principles; that is, all foreign bodies localized in the anterior chamber or lens were extracted by the anterior route and those in the vitreous were extracted by the posterior route. No attempt was made to incise the globe over the foreign body in acute cases. The quadrant of the globe was selected according to the localizing x-ray chart. The usual posterior entry was through the pars plana, the ora serrata region being invaded only in cases of extreme posterior localization. Diathermy was not used. Antibiotics were used extensively.

Statistical evaluation of the 102 cases indicated that the peak age was from 25 to 40 years with a primary incidence in males—about 30 to 1. The occupations were those of steel workers, mining auxiliaries, and engineering, and at the time of the accident, the worker usually was using hammer and chisel or hammer on metal. The time of the accident showed little relation to possible fatigue or illumination, though there was an unexplained high incidence of intraocular foreign bodies in the summer months. About 95 per cent of the foreign bodies were steel and the right eye was involved in approximately 60 per cent of the cases. The route of entry was through the cornea in about 60 per cent of the cases, with x-ray localization of the foreign body in the vitreous in about 70 per cent of the cases. In 83 of the cases the foreign body was extracted—26 by the anterior route and 57 by the posterior route. In 19 cases the foreign body was not extracted and in 4 of these extraction was not even attempted—in 3 because of the severe damage and in 1 case because the foreign body had been present 30 years and the eye was quiet.

The anterior route of extraction in this series showed much better results; the reason is obviously not the choice of surgical procedure but the fact of the anterior location of the foreign body.

In summary, the author acknowledges that the series is too small to draw firm conclusions but that certain impressions were formed:

Exact x-ray localization and "over the F.B." approach with the magnet is not essential. Retinal detachment is not frequent in the posterior approach. It occurred in only 7 per cent of the cases and it seemed that the original trauma to the retina and vitreous body caused these detachments rather than the surgery. Established vitreous infection was not controlled by antibiotics; 10 out of 12 eyes so affected had to be enucleated; however, antibiotics seemed to have a prophylactic value in this respect. A quiet eye with retained metallic foreign body must be kept under observation, but the author felt that in the few patients who retained good vision and were trouble-free for years, the foreign bodies were usually embedded in the sclera and encapsulated. —*Andreas V. Mortensen, M.D.*

A New Trachoma Concept. RENALD CHING. *Arch. Ophth.*, Chic., 1954, 51: 750.

ON THE basis of an extensive experience in an area of China where trachoma constitutes 50 per cent of all

cases of eye disease, Ching classifies trachoma into simple trachoma and infected trachoma. He believes that the confusion in the literature is due to failure to differentiate between these two types. Simple trachoma is the conjunctival tissue reaction to the trachoma virus, and comprises a quiet hyperplasia of the lymphatics of the conjunctival epithelium. The primary lesion is a follicle, located in the upper retrotarsal fold and in the epithelium of the upper cornea. Scarring and vascularization follow. The presence of the trachoma virus incites only a mild reaction in the eye, and an equilibrium is established among the normal conjunctiva, the trachoma follicle, and its products.

Of three signs of trachoma—the presence of follicles, cicatrices, and pannus—pannus is the most pathognomonic. Infected trachoma, caused by the attack of a secondary invader in addition to the presence of the trachoma virus, is a separate entity and is the trachoma described in textbooks. The author points out that regulations governing the international trachoma quarantine have become obsolete since the introduction of antibiotics, and should be revised. Simple trachoma is not contagious and should not be a reason for detention of any traveler. Infected trachoma can be arrested in a comparatively short time with modern chemotherapy, and the length and method of quarantine still in force are no longer justifiable. Ching describes a chart for recording trachoma examinations, which has been adopted by the Chinese Medical Association Committee on Trachoma, and recommends it for research and public health examinations.

—Ray Karchmer Daily, M.D.

Orbital and Transorbital Stab Wounds. POUL KJER. *Arch. Ophth.*, Chic., 1954, 51: 811.

THIS is a detailed analysis of 15 cases of orbital stab wounds with sharp instruments admitted to the State Department of Neurosurgery of the Aarhus Municipal Hospital in Denmark. In 7 cases the injury was caused by a pitchfork, and in 8 by twigs, a keyhole saw, an iron bar, and a scythe point. Three patients died and 9 had intracranial complications.

Among the 9 patients with intracranial complications, 3 did not show signs of intracranial involvement immediately after the injury. The author points out that signs of intracranial involvement easily escape recognition and may be overlooked. In 4 patients signs of intracranial involvement were overlooked and they were not transferred to the hospital until 3 to 25 days after the injury, although they had loss of consciousness followed by states of clouding or aphasia immediately after the trauma.

The eyeball was not injured in any of these cases, but 1 eye was enucleated because of retrobulbar gas gangrene. The ophthalmoscopic findings, visual acuity, and the visual field were normal in all but 2 cases. In 1 case the optic nerve was injured directly, and 1 eye was enucleated.

The most important conclusion emerging from this analysis is that patients who have sustained an injury to the orbit should be hospitalized, as both orbital and cerebral symptoms may be slight or absent immediately after the trauma. Roentgenograms of the orbital region should be taken, and during hospitalization patients should be closely watched for intracranial complications, which are indicated by such symptoms as loss of power, aphasia, and mental clouding.

—Ray Karchmer Daily, M.D.

Exenteration of the Orbit. HOWARD A. NAQUIN. *Arch. Ophth.*, Chic., 1954, 51: 850.

NAQUIN analyzes the material on orbital exenterations at the Wilmer Eye Institute during the 25 year period from 1927 to 1953. The material consisted of 48 cases, of which 14 were epidermoid carcinoma, 9 malignant melanoma, 9 orbital sarcoma, and 13 cases of miscellaneous pathologic conditions (9 various malignant tumors and 4 inflammatory lesions).

The author concludes that this is an operation indicated only for malignant tumors involving the orbit, and that a definite preoperative histopathologic diagnosis is obligatory. The operation is contraindicated in cases with metastases beyond the orbital region. In cases of extension of the tumor into the paranasal sinuses, orbitosinus exenteration is the indicated procedure. Since definite evidence of paranasal sinus involvement is not always demonstrable preoperatively, the surgeon should be prepared to exenterate the sinuses in case such extension becomes evident in the course of the orbital exenteration. The orbit may be exenterated with or without preservation of the lids. The decision as to whether the lids should be saved or sacrificed depends on the exact histologic nature of the tumor. In malignant tumors involving the lids, conjunctiva, or cornea, preservation of the lids is ill advised; this is also true when sarcoma involves the orbit. The prognosis for orbital sarcoma is poor; of the 9 patients subjected to exenteration 6 died within 1 year of the operation. Sarcoma is radiosensitive and postoperative irradiation is easier with the lids removed. Of the 9 patients with orbital extension of malignant melanoma of the choroid, only 2 survived a 3 year period. These tumors are not radiosensitive, and have no tendency to invade the lids; therefore, preservation of the lids in such cases does not invite any additional risk.

It is suggested that exenteration begin with enucleation of the eyeball, which may then be used for keratoplasty. It is advocated that a split-thickness skin graft be placed on the bare bone of the orbit. At the Wilmer Eye Institute this procedure has been used since 1944, and has resulted in a much more rapid epithelization of the orbit with fewer orbital infections, shorter hospitalization, and simpler postoperative care.

—Ray Karchmer Daily, M.D.

An Experimental Study of the Effect of Cortisone on the Eye. JULES M. YASUNA, GAYLORD W. OJERS, WILLIAM C. FRAYER, and HAROLD G. SCHEIE. *Am. J. Ophth.*, 1954, 37: 923.

THE authors report the results of an experimental study of the effect of cortisone on the eye. This study was divided into two parts: (1) the effect on corneal abrasions, and (2) the effect on penetrating wounds.

They found that the local instillation of cortisone into the conjunctival cul-de-sac of the rabbit eye appeared to be innocuous in doses up to 25 mgm. per cubic centimeter.

The subconjunctival injection of cortisone, however, in a daily dose of 1.0 mgm. in 0.2 c.c. of physio-

logic salt solution for 14 days resulted in the formation of sterile abscesses in the subconjunctival space. Because the usual clinical indication for cortisone therapy to the anterior segment of the eye is an acute inflammatory disease, it does not appear to be advisable to superimpose added insult to an already inflamed eye.

Intracorneal and intravitreous injections of cortisone caused the media to become cloudy. The media of 4 of the 12 control eyes remained hazy.

Cortisone does not appear to have any effect on the regeneration of standard corneal abrasions, and although it causes a slight delay of fibroblastic proliferation, it does not inhibit wound healing to an extent which would contraindicate its use clinically.

—*Joshua Zuckerman, M.D.*

Endocrine Exophthalmos: An Evaluation of Present Knowledge; the Fourth Estelle Doheny Eye Lecture. FREDERICK C. CORDES. *Am. J. Ophth.*, 1954, 38: 1.

IN A concise way, the author summarized our recent knowledge concerning the thyroid. The thyrotropic hormone elaborated by the pituitary gland acts in two ways: first to stimulate the thyroid and second to induce systemic effects, chiefly on the orbital structures. The thyroid hormone, thyroxin, inhibits both of these effects. Iodine inhibits the first effect.

If no thyrotropic hormone is produced, the thyroid atrophies, while if it is present in excess, Graves disease can result.

Thyroxin and potassium iodide depress the action of thyrotropin, although in normal persons the latter has a limited effect and does not alter the basal metabolic rate.

Thyrotropin causes water retention, alters the fat metabolism, and can cause a marked exophthalmos, in which the orbital structures become waterlogged and the muscles swollen and hypotonic. Fat in the orbit increases, and fat increases in the general body musculature, liver and kidneys, and plasma.

Exophthalmos can be associated with thyrotoxic disease or with thyrotropic disease, which cause two different forms of this sign. Experimentally, some workers caused exophthalmos in rats fed on propylthiouracil, and the exophthalmos showed no edema, fat deposition, or inflammation. Also, exophthalmos was produced by the administration of pituitary extract. Thyroidectomy followed by the administration of pituitary extract or thyroxin caused exophthalmos in guinea pigs. This condition could be reduced by giving iodine and thyroxin, which inhibited the thyrotropin. The role of other glands such as the adrenals and gonads has not been elucidated to date.

Interesting results were obtained by one group of workers from thyroidectomy which produced exophthalmos in guinea pigs when pituitary extract was injected, with the development of orbital edema in the fat constituent. Other body fat showed no edema. Then orbital fat was transplanted into the orbits of other guinea pigs and fat edema developed when exophthalmos was produced.

Another investigator found no difference between the exophthalmos in normal and thyroidectomized animals. He also iodinated thyrotropin and was able to inhibit the thyrotropic effect with no effect on the exophthalmic action.

It was felt generally that thyrotropic hormone was responsible for exophthalmos.

Clinically, there are two types of exophthalmos, thyrotropic and thyrotoxic. In the thyrotoxic type there is an excess of thyrotropic hormone which stimulates the thyroid to produce more thyroid hormone, and also causes exophthalmos in 50 per cent of the cases. As thyroid hormone is formed, it inhibits the pituitary from producing more thyrotropin and so the exophthalmos stabilizes. In thyrotropic exophthalmos, there is the same production of thyrotropin, but the thyroid is unable to respond and the pituitary secretes more thyrotropin so the exophthalmos increases with a normal basal metabolism rate. There may be excess thyroid hormone with no change in the pituitary hormone with the result of hyperthyroidism and no exophthalmos.

The author uses the classifications of "progressive" and "nonprogressive" exophthalmos. The latter is associated with thyrotoxicosis and characteristic general and ocular symptoms, and in 50 per cent of the cases exophthalmos is present. This exophthalmos is never progressive and never great in degree, averaging 1 to 3 mm. and it is bilateral. There is no congestion, chemosis, or lid edema, and the fields and intraocular pressure are normal; after thyroidectomy it regresses. Progressive exophthalmos is associated with thyroidectomy or mild hyperthyroidism, or it may appear spontaneously. There is always an excess of thyrotropin in the urine. The symptoms and signs include congestion, proptosis, muscle weakness, and enlarged lacrimal glands.

The complications of progressive exophthalmos are described and the effects of pregnancy noted. The effect of psychic trauma was an increase in the exophthalmos.

Pituitary exophthalmos without thyroid dysfunction was noted to be due to pituitary tumors, notably chromophobe adenomas. Since no symptoms of thyroid abnormality occur, the exophthalmos might be due to a hormone different from thyrotropin.

Unilateral exophthalmos is more likely to be progressive than nonprogressive.

The pathology of the exophthalmos of hyperthyroidism shows absence of edema but degeneration of the extraocular muscles which is different from that found in hypertrophic exophthalmos in which there is hypertrophy and degeneration with edema and chronic lymphocytic infiltration.

The treatment of endocrine exophthalmos depends on its type. That due to thyrotoxicosis is treated medically with iodine, thiourea compounds, and radioactive iodine. Iodine inactivates thyrotropin. Thiouracil is the most commonly used of the thiourea preparations. Its one disadvantage is its toxic effect, so that the recent trend is toward the use of propylthiouracil. Occasional agranulocytosis occurs.

X-ray therapy has now been discontinued. Radioactive iodine concentration in the thyroid is the most recent treatment.

Thyroidectomy, aside from its complications, cures 95 per cent of the cases. Postoperatively, there usually is a slight increase in the exophthalmos.

In the treatment of progressive exophthalmos, thyroid therapy has no effect on the exophthalmos. Stilbestrol and testesterone and ACTH were not curative and in some cases exaggerated the exophthalmos. Thyroidectomy, by increasing the production of thyrotropin, aggravates the exophthalmos and is dangerous. X-radiation of the pituitary yields unpredictable results.

Surgical treatment of exophthalmos is best limited to tarsorrhaphy for the nonprogressive type. Various procedures for the progressive type include tarsorrhaphy, canthotomy, the Kroenlein operation, excision of the orbital fat, the Naffziger operation, ethmoidectomy, and temporal decompression of the orbit. None of these is absolutely curative.

—*Albert C. Frell, M.D.*

Detection of Intraocular Tumors by the Use of Radioactive Phosphorus. CHARLES I. THOMAS, JACK S. KROHMER, JOHN P. STORAASLI, and HYMER L. FRIEDELL. *Am. J. Ophth.*, 1954, 38: 93.

SINCE intraocular tumors are adjacent to the outer surface of the eye, it is possible to use a radioactive substance which emits beta rays for their identification. In such cases the measurement obtained by counting directly over the suspected tumor is essentially unaffected by radioactivity in the surrounding normal tissue. The isotope chosen was P^{32}, which is taken up in the tumor in relatively high concentration. This isotope emits beta particles of adequate penetration and has a convenient half-life, 14.3 days.

In 44 cases studied, the measurement of the differential uptake of P^{32} in the tumors apparently revealed a clear separation of neoplastic lesions from non-neoplastic disease. The test was most definite when applied to lesions in the anterior segment of the eye.

—*James E. Lebensohn, M.D.*

Classification and Treatment of Hereditary Corneal Dystrophies. A. FRANCESCHETTI. *Arch. Ophth.*, Chic., 1954, 52: 1.

THE author discusses the classification and treatment of hereditary corneal dystrophies.

He points out that hereditary degenerations of the cornea can be distinguished from other corneal affections by their bilaterality, typical morphology, slow progression, absence of vascularization, and their onset at approximately the same age in the various members of the family.

Many sequelae of inflammatory or traumatic states may simulate degeneration.

The classical forms of familial degeneration are progressive, resulting in a decrease in visual acuity at a certain age with eventual total incapacity.

Heredofamilial degenerations of the cornea may be classified as follows:

I. Parenchymatous degeneration
  A. Classical forms (noncongenital, progressive)
    1. Dominant forms
      a. Granular
      b. Latticelike
    2. Recessive form (macular)
  B. Congenital forms (more or less stationary)
    1. Recessive
    2. Dominant
  C. Diverse forms
    1. Crystalline
    2. Primary fatty
    3. Primary calcareous (?)
    4. Cornea farinata
    5. Dystrophia filiformis profunda

II. Degeneration of the limiting membranes
  A. Anterior limiting membrane
    1. Recurrent hereditary erosions
    2. Juvenile epithelial degeneration (Meesmann's type)
    3. Juvenile degeneration of Bowman's membrane with epithelial changes
    4. Whorl-like corneal opacities (cornea verticillata)
    5. Mosaiclike (crocodile-shagreen)
    6. Band-shaped
    7. Marginal
  B. Posterior limiting membrane
    1. Cornea guttata
    2. Polymorphous posterior

III. Combined forms (parenchyma and limiting membranes)
  A. Diverse combined forms
  B. Edematous dystrophies of the cornea
    1. Primary or essential edema of the cornea
    2. "Epithelial" degeneration of Fuchs

IV. Corneal degeneration in general affections
  A. Disturbances of lipid metabolism
    1. Lipochondro-osteodystrophy of Hurler
    2. Hand-Schueller-Christian disease
    3. Diverse affections
  B. Disturbances of intermediary protein metabolism
    1. Cystine diathesis
    2. Diverse affections
  C. Cutaneous affections
  D. Diverse affections

With regard to treatment, Franceschetti points out that tuberculin therapy, antisyphilitic treatment, subconjunctival injection of chloride or cyanide, diathermy, ultraviolet and x-radiation, hormones, and vitamins have been tried, without success.

In band-shaped degeneration, abrasion of the cornea and the application of hydrochloric acid or ethylenediamine tetra-acetic acid (EDTA) may give satisfactory results (Grant).

Larocain may favorably influence the corneal clouding in the early stages of Fuchs's dystrophy.

Keratoplasty may be helpful in corneal dystrophies. In the granular form of corneal dystrophy a lamellar graft may give favorable results. In the latticelike form, good results were obtained with deep lamellar grafting. For macular and congenital forms and for Salzmann's nodular dystrophy, perforating keratoplasty is indispensable for a good visual result.

In various forms of degeneration of the anterior limiting membrane, lamellar keratoplasty is indicated.

In primary fatty degeneration the prognosis for keratoplasty is not very favorable, but good results were obtained in 2 cases with perforating keratoplasty. Fuchs's epithelial dystrophy is the most unfavorable form for grafting, whether lamellar or perforating grafts are used. The result of perforating

keratoplasty in Fuchs's dystrophy seems to be better if it is preceded by complete abrasion of the endothelium.

The mushroom graft has greatly improved the prognosis of keratoplasty in Fuchs's dystrophy, although the results are often disappointing.

—Joshua Zuckerman, M.D.

Cataract Sutures. W. L. HUGHES. *Brit. J. Ophth.*, 1954, 38: 345.

ALTHOUGH 30 years ago no sutures were used by most surgeons in routine cataract operations, today some type of suture is almost always used for the wound. During the past 15 years much has been written on the subject of cataract sutures, particularly with regard to the materials used and the tissue reaction produced by them, as well as the advantages and disadvantages of various techniques.

The author lists his criteria for the ideal sutures as follows:

1. They should be fine and pass smoothly through the tissue.
2. They should be dyed to be easily visible for handling and picking up during operations.
3. They should be sufficiently strong to hold the tissues together.
4. They should be quite flexible and remain so during the operation.
5. They should produce a small soft knot which can, if desired, overlie the cornea without damaging it.
6. They should not loosen after being tied.
7. The material should not crack or fray during manipulation.
8. The ends should be soft and lie flat so that they do not stick into or irritate the tissues.
9. They should produce minimal tissue reaction.
10. They should disappear spontaneously in about 10 days, leaving no sign of their presence. No further manipulation should be necessary at any time after the operation has been completed.
11. It should be possible to attach them simply and easily, or they should come attached to fine sharp needles that will pass through the eye tissues with little resistance.
12. The junction between the suture and the needles should be smooth, not larger than the diameter of the suture, with no protruding shoulders, edges, or ends that will catch on tissues and cause any injury in passing through.
13. The needles should be tough and not break easily on being grasped with the ordinary needle holders now in use.
14. The needles should be uniformly sharp with a moderately curved cutting edge.
15. The most useful length of suture is about 14 inches.
16. The material should not swell, shrink, or weaken on being soaked in ordinary sterilizing solutions.
17. The sutures should be amenable to being sterilized and resterilized without losing any of their qualities.
18. They should be easily obtainable and reasonably priced.

Various materials were tried by the author. Fine black silk was the first type of suture used. It was flexible and strong; it knotted well, and produced as little reaction as any other suture; however, it had the disadvantage of having to be removed postoperatively and it led to such accidents as springing the wound with loss of the anterior chamber and hyphema.

Monofilament and braided nylon were tried next and had the same objectionable features as silk.

No. 0000 and 00000 plain gut suture were tried; the former was found to be too coarse and produced too much tissue reaction. The latter produced very little more reaction than the nylon or silk but the sutures were too coarse and the needles were not fine enough for fine cataract surgery. A No. 000000 plain gut suture was tried but disintegrated in too short a time—4 to 5 days. Next a mild chromocized No. 000000 gut suture with a sharp needle was made and found to be satisfactory in most respects except that it could not be colored satisfactorily and was not easy to see without being dyed. It was not as flexible as it should be and it was thought that as it held for 14 to 24 days this period was excessively long. The author also thought that the knots were too hard to be placed over the cornea and that the needle swaging was sometimes faulty although this has been somewhat corrected.

The author's criteria for the proper closure of a cataract wound are summarized as follows:

1. The cornea and scleral margins of the wound should be accurately approximated and amenable to quick sealing by the healing process.
2. The closing effect of the suture should extend along the limbus as far as possible. A mattress suture is thought to be best for this purpose.
3. The portion of the suture in the cornea should be placed before the eye is opened.
4. The corneoscleral loop of the suture should not include the margin of conjunctival epithelium covering the limbus or the edge of a conjunctival flap.
5. The closure should be strong enough to resist an intraocular pressure of considerable force (at least 80 mm. Hg was selected as an arbitrary figure) for the first 4 to 5, and preferably 7 to 8, days.

The author states that after trying most of the suturing techniques described in the literature he has developed a procedure which is most satisfactory to him. This procedure is a modified Stallard suture so that the edges of the conjunctival flap are kept out of the wound, somewhat after the manner used with the McLean suture.

The technique of the author's suture is completely described and well illustrated and a complete summary of the advantages of this suture is given.

Reference might well be made to the complete article by those who like a Stallard type of suture but wish to modify it in an advantageous manner.

—Andreas V. Mortensen, M.D.

Metastatic Tumors of the Uveal Tract. EARL MAXWELL. *Am. J. Ophth.*, 1954, 37: 867.

THE author discusses metastatic tumors of the uveal tract.

He points out that metastatic tumors of the uvea are predominantly carcinomas, but hypernephroma, malignant melanoma, sarcoma, chorionepithelioma, and teratoma have all been reported.

The primary site of about 65 per cent of these tumors is the female breast. The lungs, bronchi, and

gastrointestinal tract account for 10 per cent. The prostate, thyroid, adrenal glands, bone, skin, testicles, male breast, liver, parotid gland, ovaries, and the uterus account for the remainder.

The site of the secondary tumor is predominantly near the posterior pole of the eye. The ratio of choroidal involvement to iris involvement is about 9 to 1.

The incidence of bilateral metastasis is about 25 per cent.

Maxwell reports a case which occurred in a woman 59 years of age, with previously undiagnosed adenocarcinoma of the bronchus and malignancy of the cervix for which a hysterectomy had been performed 13 years previously. Metastasis had occurred to the left choroid, ciliary body, and optic nerve with extension through the sclera into Tenon's capsule and also through the posterior emissary into the orbital tissues. There was a total separation of the retina, the optic nerve showed no gross abnormality, and the lens was intact. —*Joshua Zuckerman, M.D.*

The Pathological Basis of Retrolental Fibroplasia. NORMAN ASHTON. *Brit. J. Ophth.*, 1954, 38: 385.

THE author presents 4 case histories with autopsy and pathological eye findings, in which the early changes of retrolental fibroplasia are described.

Early changes in the temporal retina, and in the equatorial region, consisting of extensive growth of the new vessels ending in capillary tufts buried in yellow gelatinous material, were characteristic. Some cases showed detachment. The new vessels arose from the ganglion and nerve fiber layers, never from the outer retinal layers. These vessels invaded the vitreous where the fibroblasts proliferate to form the fibrous membrane.

The region of the ora was invaded secondarily and never affected initially. This opposed the view of Heath who found the ora changes to be primary.

Spindle cell proliferation in the inner retinal layers, described by others as glial cells, were concluded to be mesenchymal precursors of the retinal vessels.

Iris vascularization was found inconstantly and disappeared often before pathological sections were made.

Using the strict criteria of vascularization into the vitreous as the first stage of this disease, the author concludes that it does not occur prenatally. Neither did it occur in 280 cases in which oxygen was not given. Never has he seen it in a full-term infant.

The author toyed with the idea of a new name, suggesting the primary nature and the noninflammatory origin of the disease as well as the role of oxygen in its development. —*Albert C. Frell, M.D.*

Angioid Streaks: Tears in Bruch's Membrane or Pigmented Choroidal Vessels? ALEXANDER R. COWPER. *Arch. Ophth.*, Chic., 1954, 51: 762.

THE author presents a review of the literature and a report of 2 cases. The findings in these 2 cases are used in support of the author's theory concerning the nature and origin of these streaks. The author rejects the belief that angioid streaks are tears in Bruch's membrane and believes that they represent excessively pigmented vessels in the choroid. He points out that the generally accepted view, that the streaks represent tears in Bruch's membrane, is incompatible with the clinical picture and is not supported by pathologic studies. He believes that the streaks are a manifestation of a primary vascular disorder in the choroid, which is a local expression of a generalized vascular disease. A weakness of the choroidal circulation with, at first, serous extravasations, and later hemorrhagic extravasations, usually accompanied by migrations of pigment epithelium into the affected vessels, best explains the origin and nature of these streaks.

The author finds support for this theory in the shape and location of retinal hemorrhages and in the macular changes associated with angioid streaks. The linear hemorrhages point to a disease of the vessel wall, which leads to extravasations of blood along considerable portions of their length rather than at isolated points of weakness. If, early in the disease, these extravasations were serous rather than hemorrhagic, and the pigment epithelium reacted by migrating along the affected vessels, these streaks could develop without any prior hemorrhages. The appearance of the streaks, the tapering, ampulliform dilatations, variation in the depth of their position and color, lend support to the hypothesis that they are blood vessels. —*Ray Karchmer Daily, M.D.*

Direct Observation of the Effect of Oxygen on Developing Vessels; Preliminary Report. NORMAN ASHTON and CHARLES COOK. *Brit. J. Ophth.*, 1954, 38: 433.

IN ORDER to directly observe the peculiar type of vasoconstriction and obliteration in growing retinal arteries by high oxygen concentration, the authors have devised a new limbal window technique which permits direct observation of retinal vessels.

Embryonic vessel study was carried out in hen's eggs, and adult vessels were studied with the use of rabbit corneae and ear chambers. Groups of alloxan-induced rabbits with corneal vascularization were placed in oxygen chambers with 70 to 80 per cent oxygen immediately after, and again 6 days after alloxan injection. Examination showed no effect whatsoever on growing vessels in rabbit corneas.

Perspex chambers were inserted into one ear of 5 rabbits, and the animals were placed again in a 70 to 80 per cent oxygen chamber. No effect was noted on growth or patency of the vessels. An anesthesized kitten was used for a new technique of limbal window examination. Cornea, iris, and lens (except the posterior capsule) were excised and the eye was fixed in a metal ring with a glass disc cover. The animal was placed in a Perspex box where oxygen was administered, and the retinal vessels were clearly examined by means of a mercury lamp and condensing system.

An adult cat showed no vessel changes with 80 per cent oxygen. An 11 day old kitten showed completely closed capillaries and markedly narrowed larger vessels. On return to air, the vessels all reopened in 5 to 10 minutes, and on return again to oxygen the vessel narrowing recurred.

A 12 day old kitten was given 70 to 80 per cent oxygen for 4 hours before a limbal window was inserted. After 6¾ hours, the capillaries had closed; in 7½ hours, all arteries were closed and after 8 hours, capillaries, arteries, and veins were closed. Amyl nitrate had no effect on the closed vessels.

On return to air, after 30 minutes, all vessels opened, but not completely. On return to oxygen, complete closure developed and again return to air opened the vessels; then oxygen and 5 per cent carbon dioxide were given, with closure again. Raising the temperature from 27 to 37 degrees C. had no effect. Priscol was given and the vessels reopened slowly to an incomplete degree.

Another 12 day old kitten was exposed to 70 to 80 per cent oxygen with complete vessel closure. A retinal detachment developed in one area and the vessels in the detached area reopened while those in the normal retina closed; then return to air reopened all vessels. Return to oxygen closed only the vessels of normal retina. Eventually all the retina was detached and all vessels reopened.

In conclusion the authors state that oxygen has no effect on retinal vessels of the adult cat; on developing vessels, all vessels close for 10 minutes, then begin to open (a delayed effect occurs where all vessels completely close); total obliteration is not affected by amyl nitrate or changes in temperature; vessel obliteration cannot be induced in the detached retina; chick embryo experiments showed that chick embryos may survive high oxygen concentrations and develop normally. —*Albert C. Frell, M.D.*

Effect of Oxygen on Developing Retinal Vessels, with Particular Reference to the Problem of Retrolental Fibroplasia. Norman Ashton, Basil Ward, and Geoffrey Serpell. *Brit. J. Ophth.*, 1954, 38: 397.

Believing fundamentally that the etiology of retrolental fibroplasia was based on excessive oxygen as a stimulus to overgrowth of the normally developing retinal vessels, and in order to evaluate the conflicting theories of its origin, the authors studied the retina of kittens which had been shown to develop similarly to that of man.

This study was detailed and complicated and several important findings emerged.

High oxygen concentrations can obliterate developing retinal vessels, some completely and others partially. The first portion of the vessel system to occlude was the arterial side, followed by capillary occlusion, and then occlusion of the venous side. Initially the peripheral vessels were involved since they were the most immature, then the posterior vessels, and finally the vessels at the disc were occluded.

It was very interesting to read that the other ocular vessels such as those in the choroid bed and the hyaloid artery were not affected, nor were vessels of the brain or other organs involved.

The vasoobliterative effect of oxygen was found to be inversely proportional to the maturity of the vessels, and once the vessels are fully established there is no effect.

The duration of exposure to high oxygen concentration affected the extent of occlusion which began in 12 hours and was complete in 36 hours.

The younger the retina and the higher the oxygen concentration, the more severe was the reaction.

When total vessel occlusion occurred, re-exposure to the air caused no, or only minor, dilatation of the vessels, which then atrophied. Concurrently, revascularization starts at the disc, but is of an abnormal character, being more extensive and more plexiform. It is the new vessels which grow into the vitreous and on the anterior surface of the iris. It was interesting to note that there was only a regional vaso-obliterative effect, the new vessels forming from all unaffected vessels and not only from the disc as in total vascular occlusion.

The factors influencing obliterated vessels included: prolonged hyperoxia, in which it was shown that the vessels remained closed as long as the animals were in oxygen; hyperoxia, in which the animals were transferred into a 10 to 15 per cent oxygen concentration instead of air, and which produced no different results than prolonged hyperoxia; concentration of carbon dioxide had no effect on vaso-obliteration; prescoline administration had no effect; tromexan, an anticoagulant, showed an inhibiting effect on the obliterative process, but its relevant properties were unknown in these experiments.

This excellent presentation is concluded with a complete and concise summary of the results, and a correlation of these results with current thoughts on this problem. —*Albert C. Frell, M.D.*

The Origin of the Electroretinogram. Werner K. Noell. *Am. J. Ophth.*, 1954, 38: 78.

The selective effects of sodium azide and iodoacetic acid upon the visual cells and pigment epithelium indicate that the C-wave of the electroretinogram represents a reaction of the potential difference across the pigment epithelium in response to ionic concentration changes produced by the visual cells, and that the area involved in the production of A-waves and B-waves extends from the region of the outer limbus to the outer plexiform layer inclusive.

—*James E. Lebensohn, M.D.*

EAR

Carcinoma of the Middle Ear. Maxwell Ellis and Robert Pracy. *Brit. M. J.*, 1954, 1: 1413.

Carcinoma arising primarily in the epithelium of the middle ear cavity or of the mastoid air cells is rare. Only 120 cases were found reported in the literature, and some of these included cases of growths arising in the external canal or meatus. It is usually impossible clinically to decide whether one is dealing with a carcinoma of the tympanum or of the external canal.

Six cases reported in this article illustrate some distinct features occurring in carcinoma of the middle ear. Pain was a feature in each case, and in 3 cases was unrelieved by treatment. The cause of the pain is obscure, but it is probably not caused by pressure from an expanding tumor. Infection, or involvement of the dura by the tumor, does not satisfactorily explain the pain.

Genuine chronic suppuration occurred in only 2 of the 6 cases. In the other cases the otorrhea could be attributed to the presence of the tumor rather than to pre-existing suppuration.

Facial paralysis occurred in 3 cases. Blood-tinged aural discharge was present in 4 of 5 cases. Neighboring or distant metastases have rarely been reported in the literature, but occurred in one of the cases reported by the author.

Pain and the presence of blood-stained aural discharge, particularly if there is also facial paralysis, are the most reliable indications of malignant disease of the middle ear. The diagnosis must be confirmed by biopsy.

The cause of death is usually given as malignant cachexia. Invasion of the meninges leads to fatal intracranial complications. In some cases erosion of the jugular bulb or of the internal carotid artery leads to fatal hemorrhage. Death from a distant metastasis has not been reported.

The mode of treatment should be a combination of surgery and radiotherapy. The extent of the surgery varies with the extent of the disease. No anatomical boundaries should be respected and no attempt should be made to preserve any involved structure which can be excised. This includes the inner ear, the temporomandibular joint, facial nerve, external ear, adjacent parts of the base of the skull, and the parotid gland.

The tumors are not highly malignant and distant metastasis is almost unknown. The problem is entirely one of adequate local removal. This applies particularly to bone since radiotherapy is unavailing in growth deeply buried in bone. Irradiation appears to be effective in controlling soft tissue invasion.

The prognosis in middle ear carcinoma is very poor. In only 1 case found in the literature has a patient survived for more than 5 years. Dural involvement worsens the outlook. —*Fletcher Austin, M.D.*

NOSE AND SINUSES

Exogenous Foreign Bodies of the External Auditory Canal, Nasal Cavity, and Esophagus; Report of 2 Cases of Coins in the Esophagus Occupying the Sagittal Plane. J. C. PEELE. *Arch. Otolar.*, Chic., 1954, 59: 672.

THE author reviews the literature and presents 22 cases of exogenous foreign bodies: 7 aural, 5 nasal, and 10 esophageal. He calls special attention to 2 cases he encountered of coins in the esophagus, occupying the sagittal plane.

From February 1, 1948 to July 31, 1953 he saw 6,983 new patients in his office practice. Of these, there were 48 patients with 52 foreign bodies in the external auditory canal, 17 with nasal foreign bodies, and 38 with foreign bodies of the esophagus.

The symptoms of foreign bodies in the external auditory canal depend to a large extent on the nature of the foreign body, its location in the canal, and the length of sojourn. There may be a complete absence of symptoms or varying degrees of pain, discomfort, impaired hearing, discharge, tinnitus, itching, and bleeding. Symptoms may develop immediately or only after a latent period of weeks, months, or even years.

Foreign bodies in the nose are usually seen promptly, produce few symptoms, and are easily removed. However, the commonest complication of nasal foreign bodies of long duration is chronic infection of the nose and paranasal sinuses of which the ethmoids and antra are particularly vulnerable.

Foreign bodies in the esophagus are usually seen promptly and produce immediate symptoms. In most instances the initial symptoms may include choking, gagging, retching, vomiting, discomfort, pain, dysphagia, bleeding, and pain in swallowing of varying degrees and duration.

Most foreign bodies are arrested in the cervical esophagus at the level of the superior aperture of the thorax. While flat objects nearly always lie with their greatest diameter in the coronal plane when in the esophagus, 2 cases were presented in which the coin was in the sagittal plane.

The author also presented a case of serious hemorrhage from rupture of an intramural esophageal vessel associated with attempts at removal of an esophageal foreign body with lacerating potentialities.

Pain referral from an esophageal foreign body may be bizarre and misleading. Complications following esophagoscopy in the removal of foreign bodies may include atelectasis and acute cardiac arrest with fatal termination.

Nuts and vegetables may cause esophageal obstruction in children. —*John R. Lindsay, M.D.*

Treatment of Nasal Polypi, with Comments on Frontal Sinus Surgery. J. A. HARPMAN. *Arch. Otolar.*, Chic., 1954, 59: 655.

THE author discusses and describes methods for curing nasal polyposis.

He has found on several occasions that allergic nasal polyps, if small and early in their development, will disappear under local or general antiallergic treatment. Such, however, is unusual.

Cure of nasal polyps is dependent on removing or otherwise treating the diseased tissues from which the polyps arise. The extent of the surgery required depends upon the severity of the condition. When only a few nasal polyps are present, cure may follow their simple removal; recurrence of the polyps is less likely if removal is followed by gentle curettage of the base.

In some cases, especially elderly patients, he uses the intranasal ethmoidectomy.

When the polyps arise from the antra, he uses the Caldwell-Luc operation with removal of the antral mucosa. There are a number of patients, all of whose nasal sinuses are full of polyps and also pus, in whom the best recommendation is often removal of the diseased lining from all the sinuses. For the radical procedure he combines the Ferris Smith and Norman Patterson operation. He describes and illustrates his surgical technique.

When a frontal sinus is so infected that conservative measures fail to relieve it and it comes to require external surgery, the infected lining should be removed. Drainage of the sinus cavity into the nose after the operation is required only until healing has taken place. When the mucosa has been completely removed from a small frontal sinus, the whole cavity of the frontal sinus becomes filled with new fibrous and bony tissues as healing takes place; when the frontal sinus is large, healing results and there remains only a small cavity, the new cavity becoming filled with new fibrous and bony tissue similar to that which occurs in the mastoid and aditus following cortical mastoidectomy. The operated upon frontal sinus cavity is now filled with a paste of plasma powder and penicillin solution to aid rapid healing with a fibrous tissue which resists reinfection.

He has had only minor complications and no recurrences of polyps in a series of 50 cases.

—*John R. Lindsay, M.D.*

MOUTH

The Rationale for Velar Closure as a Primary Procedure in the Repair of Cleft Palate Defects. WAYNE B. SLAUGHTER and SAMUEL PRUZANSKY. *Plastic & Reconstr. Surg.*, 1954, 13: 341.

IN THE past, the rationale for repair of clefts of the palate has been based on the assumption that the problem was only that of closing a defect or hole in the structures involved. Little consideration was given to the growth potential of the bony framework around the defect or to the dynamics of the adjacent muscle structures. The various structures that comprise the totality of the head increase in size at different rates, and in this way growth brings about alterations in proportion as well. The problem is to determine the effect of surgery on the potential for growth. Surgery can do one of two things, viz., aid in directing the natural growth processes into proper channels through establishment of muscle balance across the defect, or grossly interfere with the normal developmental changes by hindering growth through interference with blood supply, introduction of scar, or destruction of growth centers. The surgical procedure must be altered to fit the particular case, both in terms of time and technique.

The embryology of the oral cavity is discussed. When there is a cleft in the lip or palate, the muscles of the lip, cheek, and pharynx do not exert their normal sphincterlike actions. The antagonistic muscular balances that normally mold and shape the developing bony framework of the palate and pharynx are missing, in part or in their entirety. Instead, the aberrant muscular forces, induced by a break in the sphincteric arrangement, act to displace tissue masses and to open the defect ever wider.

Due to the wide variations, it is not possible to form a rigid classification of defects. To facilitate some characterization of the defect, variations can be described in any of four general ways:

1. Adequacy of tissue.
2. Spatial configuration of anatomic segments.
3. Deformation of bony and cartilaginous structures because of aberrant muscular forces acting both in prenatal and postnatal developmental periods.
4. The relationship of the palate to contiguous anatomic structures in the pharynx. The displacement of tissues is the most commonly encountered defect in terms of the total architecture of the palate and pharynx. The composite structures are often intrinsically adequate, but are merely malposed.

Direct measurements have clearly demonstrated that following lip closure there is a concomitant reduction in the width of the cleft in the palate. This reduction in the width of the cleft is not limited to the region of the alveolar process but extends as far back as the tuberosities of the maxillae. The orbicularis oris and buccinator muscle are continuous with the constrictor pharyngis superior muscle by virtue of common points of attachment. In effect, there is a continuous sphincteric ring of muscle that sweeps forward from the base of the skull to envelop the pharynx, the palatal, and the alveolar processes. When the anterior region of this complex band of muscle is repaired surgically, the effect is far-reaching and manifests itself in a molding action which tends to approximate the segments of the maxillae, and consequently reduce the lateral dimensions of the cleft. The authors discuss the actions of the various muscle groups and the part they play in the configuration of the defect.

Since repair of the lip altered the spatial configuration of the skeletal framework so profoundly in the anterior segment of the cleft, it was reasoned that repair of the velum might achieve the same beneficial results in the region of the nasopharynx. The decision to repair the velum is derived from an analysis of a group of interrelated factors — the width of the cleft, the character of the tissues adjoining the defect, the length and mobility of the velum, the relation of the velum to contiguous areas in the nasopharynx, and the systemic state of the patient.

As a result of velar closure, the first step toward rehabilitation is begun. Further growth and development of the palate and pharynx must now follow the pattern imposed by the new muscular functions. Whether or not a cleft is completely closed is of secondary importance at this time. Surgical closure of the velum does more than repair a congenital defect: it provides a more normal physiological environment in which growth and development may take place. As additional growth occurs, repair of the cleft in the hard palate may become more feasible. Repair of the defect in the hard palate is not complicated by antagonistic muscle tensions, and does not pose the problem encountered in repair of the velum.

The authors present 4 cases, from their 200 cases of cleft repair, in which repair of the velum was the primary step in the closure of the cleft palate. Their findings were documented by means of longitudinal growth studies utilizing cephalometric roentgenography and casts of the palate. —*John R. Lindsay, M.D.*

Giant-Cell Tumor of the Mandible Associated with Hyperparathyroidism and Osteitis Fibrosa Cystica Generalisata. RUSSEL D. COLEMAN. *Oral Surg.*, 1954, 7: 534.

THE author reports the case of a 30 year old white woman with a smooth, firm, tender swelling on the right side of the mandible. X-rays showed extensive osteoporosis of the right side of the mandible; the buccal and lingual cavities were expanded. The lamina dura was visible about several anterior teeth while within the osteoporotic area it was undetectable. Considerable displacement of the teeth occurred as the result of the growth of the tumor, but without evidence of root resorption.

Biopsy of the mass showed replacement of the original bone trabeculae of the right side of the mandible by a young connective tissue stroma. Numerous multinucleated giant cells were scattered throughout the fibrotic marrow cavity with a reported diagnosis of central giant cell (brown) tumor of the mandible associated with hyperparathyroidism.

Laboratory studies of the blood and urine revealed a characteristic biochemical syndrome of hyperparathyroidism—hypercalcinemia, and a rise in the alkaline phosphatase level.

After surgical removal of a parathyroid adenoma there was a rapid remission of the symptoms. The serum calcium and phosphorus returned to normal limits in several weeks.

Another biopsy, 2 months after removal of the parathyroid adenoma, showed the formation of new bone trabeculae and a decrease in the number of giant cells.

Bones or areas of bones, such as the jaws, which are continuously in a state of active bone growth as a result of stimulation by strong functional stresses and strains, seem most likely to be implicated in this disease. Early recognition of the condition is imperative if serious skeletal and renal complications are to be avoided. —*John R. Lindsay, M.D.*

A Case of Suspected Renal Cell Carcinoma of the Mouth. DANIEL J. HOLLAND. *Oral Surg.*, 1954, 7: 453.

A CASE of carcinoma of the mouth in a 25 year old female typist is reported. She had a warty, granular mass (1 by 1.5 c.c.) on the posterior right palate close to the tuberosity of more than 6 months' known duration. There were no palpable neck nodes.

A biopsy was performed and carcinoma was diagnosed. The tumor was composed of masses of very large, rather clear cells which were compatible with origin from either the salivary or sebaceous gland.

The tumor was widely excised and the tumor bed was thoroughly electrocoagulated.

After microscopic examination of the specimen, the pathologist suspected a metastatic renal cell carcinoma.

On pyelography, the left kidney exhibited a slight bulge at its midportion laterally and the minor calyces bilaterally were somewhat dilated without localized calyceal deformity.

The left kidney was explored and the protrusion was biopsied; it showed normal kidney tissue. The right kidney was explored retroperitoneally through the incision and was found to be normal.

The patient made an uneventful recovery and returned to work; she was symptom free. The origin of the tumor remains undetermined.

—*John R. Lindsay, M.D.*

Carcinoma of the Floor of the Mouth. STANFORD CADE. *Brit. J. Surg.*, 1954, 41: 225.

CARCINOMA of the floor of the mouth is a clinical entity only in its early stages. The lesion commonly spreads beyond the floor itself to involve the adjacent structures. This spread is usually in three directions: to the intrinsic and extrinsic muscles of the tongue, to the gum, with or without involvement of the alveolus, and to the cervical lymph glands.

Histologically, the tumor is an epithelioma varying in degree of keratinization and anaplasia. Clinically, it is either an exuberant mass or an ulceration with indurated edges. From 80 to 85 per cent of the cases occur in men. Leukoplakia of the floor of the mouth and of the gingival mucosa is frequently seen. Dental sepsis is common but many cases occur in patients edentulous for years.

The differential diagnosis includes chronic inflammatory conditions, specific infections, and salivary calculi. Difficulty of diagnosis may be caused by benign mucous and salivary gland tumors, acute monocytic leukemia with mouth ulcerations and enlarged cervical glands, rhabdomyosarcoma, and metastases to the floor of the mouth, gum, or jaw from a silent primary tongue carcinoma. A further point of interest in the natural history of carcinoma of the floor of the mouth is the rather frequent occurrence of a second, and independent, primary carcinoma elsewhere in the body.

The material presented covers the 25 year period from 1925 to 1951. In this time there were 118 cases of which 97 lent themselves to a 5 year study. Despite rapid advances during this period in both surgical and radiological techniques, carcinoma of the floor of the mouth remains a formidable problem, and no one method can claim pre-eminence in its control. Halfhearted attempts by any method are doomed to failure. Dependence on a single technique of treatment will seldom lead to control of the disease.

The methods of treatment are radiotherapy or excision. The author uses radium either by needling or teleradium application. Intraoral applicators and conventional x-rays were seldom used.

Radiotherapy is the method of choice in the treatment of early localized carcinoma of the floor of the mouth. When limited to the mucosa or submucosal areolar tissue of the floor of the mouth radium alone given interstitially is sufficient. When the disease has spread to the surrounding muscles of the tongue or floor of the mouth radium given interstitially or externally by teleradium, in a minimal dose of 7,000 roentgens is indicated. When the lesion has extended to the gum mucosa, but not to the bony alveolus, teleradium is preferable to radium needles. Supervoltage x-rays at 2 M.E.V. are equally effective. A few cases do not respond satisfactorily to radiotherapy. Failure to respond to an adequate dose must be recognized and surgical intervention considered.

Invasion of bone by the lesion is an indication for surgical treatment as first choice. Some patients with bone involvement respond to irradiation, and patients who are considered unsuitable for surgery, or inoperable, should be treated by irradiation.

Patients suitable for surgical excision fall into two groups. In the first group the growth is still limited in extent and permits the preservation of skin and subcutaneous tissue and immediate closure of the wound without any grafting procedure. The deformity resulting from removal of half the lower jaw is surprisingly small. The second group consists of those patients in whom the disease has involved the lower jaw extensively. Very wide excision with sacrifice of the lip and skin is essential. The deformity is very great. Since elderly age groups tolerate prolonged multiple-stage operations poorly an attempt at immediate repair should be made even at the sacrifice of the cosmetic result.

If treatment controls the primary growth and the cervical lymph nodes are enlarged, but operable, a block dissection of the nodes is done. If the glands are adherent or fixed, palliative radiotherapy to the nodes should be given.

In view of the magnitude of the surgical procedure, the patients to be operated upon should offer a good prognosis. The criteria of inoperability include (1)

spread of the disease posteriorly to involve the pharyngeal mucosa or pharyngeal part of the tongue, (2) lymph nodes adherent or fixed to the carotid sheath, (3) edema of the subcutaneous tissues, and (4) gross involvement of the soft tissues in the submandibular or submental areas.

Eighty-nine of the 97 patients treated by all methods could be followed up; 24, or 27 per cent, remained well for periods of 5 years or more. In early localized lesions radium therapy gave a 45 per cent 5 year survival rate. When the mandible was involved, surgery (with or without radium) gave a 41 per cent 5 year survival rate. Involvement of the tongue by direct extension or cervical node metastases reduced the 5 year survival rate to 17 per cent.—*Fletcher Austin, M.D.*

Carcinoma of the Floor of the Mouth. B. W. WINDEYER. *Brit. J. Surg.*, 1953, 41: 231.

THIS article is based on the study of 131 patients treated during the years 1931 to 1946. More than half of the patients were in the 60 to 69 age group. There were 118 men and 13 women. Included in the study were lesions involving the floor of the mouth and those involving the floor of the mouth and the lower alveolus. The most frequent associated abnormality was leukoplakia—many lesions appearing to have developed in such a patch. Dental sepsis was common but many cases occurred in edentulous patients.

The histologic diagnosis was almost invariably squamous cell carcinoma, the majority of the lesions showing well marked keratinization. A few showed no keratinization, and there was an occasional undifferentiated carcinoma.

The symptoms were variable. Often it was the feeling of a lump in the mouth or discomfort from an ill-fitting denture. Many times a lump in the neck, or a change in speech was the first indication. Pain was not a marked feature unless the disease was well advanced with marked infection and extensive bone involvement.

The most frequent early case was an ulcerated lesion with surrounding induration near the midline in the floor of the mouth. It involved the frenum or was associated with the orifice of one of Wharton's ducts. If the lesion originated on the alveolus it was ulcerating in type and extended quickly to the floor of the mouth, into the bone, and toward the cheek, or it was hypertrophic instead of ulcerating. The most frequently undiagnosed lesion was a small, superficial hypertrophic nodule which, despite its mild appearance, gave rise to extensive glandular metastases as the presenting symptom. In the latter stages of the disease the lesion spread outward and downward to ulcerate the skin over the jaw or in the submental region. The mouth lesion became a large necrotic cavity with exposed mandible in front and a fixed, indurated tongue behind. In this phase the patient deteriorated rapidly and pain became constant and intolerable.

Treatment of these patients varied with the extent of involvement. Of the 131 cases 13 were considered too far advanced and no treatment was given. Three patients were treated for the primary lesion by surgery; 115 were treated for the primary lesion by various techniques of radiotherapy. Block neck dissection for involved cervical glands was done only in those cases considered operable and in which the primary lesion was considered to be controlled by radiotherapy. In the more advanced cases, and in those considered inoperable, radiotherapy alone directed to the involved glands was used palliatively.

The primary growth was treated with radium applied to the lesion by an intrabuccal applicator incorporated in a dental appliance, by teleradium, and, when necessary, by a single plane radium implant through the anterior part of the tongue transversally across the mouth to irradiate posterior extension into the tongue. These methods were considered superior to the implantation of radium needles. A tumor dose of about 7,000 roentgens was given.

Of the 3 patients treated by surgery 2 remain alive 15 and 14 years after surgery. Of the 115 patients treated by radiotherapy to the primary lesion 33, or 28.7 per cent, were alive and free from recurrence at the end of 5 years. In this series 12 patients developed at least one further primary cancer elsewhere in the body.

Hemorrhage from the ulcerated area may occur during the treatment of advanced growths. Soft tissue necrosis does not occur so often now that infection can be controlled by antibiotics. Necrosis of bone, early or delayed, is the main complication of radiotherapy to be feared. Sequestration is slow, and pain is severe and protracted.

As a result of the experience gained in the treatment of this series of cases, the present practice is to submit more patients to radical surgical excision. Carcinoma of the alveolus with involvement of bone is best treated in this way. When bone is involved surgical excision should be undertaken despite the extensive procedure and the production of deformity. If bone is involved, but the patient is not considered suitable for surgery, it is possible in some cases to destroy the cancer by irradiation even though bone necrosis means a protracted period of pain and disability.

—*Fletcher Austin, M.D.*

Carcinoma of the Floor of the Mouth. A. J. GARDHAM. *Brit. J. Surg.*, 1953, 41: 241.

THE present article is based on 72 patients who were treated at University College Hospital from 1920 to 1947, with the exception of 1 patient who was treated by Christopher Heath in 1875. Between 27 and 28 per cent of the patients lived more than 5 years and are either still living, free from recurrence, or have succumbed to other diseases after the 5 year period; some were treated by surgery, some by irradiation, and still others were treated by a combination of the two methods.

The fact that the overall cure rate is so constant with different forms of treatment suggests very strongly that there is a proportion of cases of carcinoma of the floor of the mouth in which the disease is relatively benign and localized, and can be cured by any one of a number of different treatments.

The second significant fact is the extreme rarity of good palliative results.

The "curable cases" showed no common factor in the history or physical signs which could have been used as a guide for preselection. Fifty per cent of the patients were treated by surgery and 50 per cent by

irradiation, and there were 12 cures—6 by surgery and 6 by irradiation. The equality of the numbers serves to strengthen the suggestion that it is the nature of the disease and not the nature of the treatment which decides the possibility of cure.

Three of the patients treated by irradiation developed second primary growths, 1 developed sarcoma in the irradiated area, and another developed severe necrosis of the lower jaw.

All the patients who were treated by surgery had some deformity but none was disabling to the extent of requiring plastic repair.

Surgery is contraindicated in the presence of extensive involvement of glands and when the primary involvement is still small. Growths in which the submucous spread is very wide in comparison to the size of the ulcer also do not respond very well to surgery, and a third group of lesions in which surgery is not effective is that in which the bone of the lower jaw is expanded.

The author describes his surgical technique and recommends both tracheotomy and gastrostomy following surgery. —*John R. Lindsay, M.D.*

Carcinoma of the Floor of the Mouth. J. L. DOBBIE. *Brit. J. Surg.*, 1953, 41: 250.

DOBBIE discusses the methods and results of irradiation therapy of carcinoma of the floor of the mouth at the Christie Hospital and Holt Radium Institute of Manchester.

It is necessary to separate radium treatment of the primary lesion from the treatment of secondary lymphatic extension, which, whenever possible, is entrusted to block dissection.

Each primary treatment represents the individual application of an appropriate technique to the patient treated, and the results shown all relate to moulds and implants in nearly equal proportions. The author states that x-rays are practically never applied to the floor of the mouth.

The double mould is one of the most characteristic methods used. Like other brachyradium methods, it has the advantage of confining the effect of the radium to the minimum necessary volume, and is completely controllable as regards area covered and dose delivered. It has the particular merit that any area of invasion of the jaw can easily be included in an effective field of radiation. With this method, invasion of bone is no contraindication to radium treatment, or necessary bar to cure, in spite of the contrary opinion sometimes expressed.

In about half of the cases, a satisfactory mould is not possible, and implanted radium must be used. The needles are 4.5 cm. long and pass through the tongue into the floor of the mouth.

A third common method is the radon implant in gold seeds, particularly suitable for small and superficial lesions, and for the aged.

The results, as a whole, may be conveniently summarized as showing a cure rate for early cases of about 60 per cent, and 30 per cent for cases which do not develop secondary nodes qualifying for block dissection, and also for the whole group of patients, with all stages of the disease and of all ages.

—*John R. Lindsay, M.D.*

NECK

The Blood Supply of the Thyroid Gland; the Nodular Gland. NEIL JOHNSON. *Austral. N. Zealand J. Surg.*, 1954, 23: 241.

THE author presents an anatomical explanation for the development of the nodular goiter, and a brief historical survey of the vascular anatomy of the thyroid gland. With his material, which included 28 nodular glands, he shows the development of the nodule from the normal lobular structure. A number of photographs, photomicrographs, and diagrams are used to illustrate salient points. The material was prepared by various injections and observed after frozen section. Some of the tissue was prepared by perfusion and staining.

The gland is considered to be essentially lobular, and the blood supply is composed of interlobar arteries which divide into interlobular arteries, the latter dividing into lobular arteries which supply the lobule.

The most important information was obtained from the more normal glands with small nodules. In these the nodules could be seen to follow the lobular pattern, and the distinction was seen in the number and size of the vesicles. The nodules may change in size, undergo hyperplasia, or involute. If the lobular change is uniform, a diffuse enlargement of the gland results.

Early in the development of a nodule it can be shelled out from the surrounding tissue with ease. Occasionally the lobular artery can be discerned. The vascular pattern in the nodule is essentially the same as in a lobule. The cords of parenchymal cells are surrounded by a capillary network. The functional capacity of the capillary bed varies considerably. In a nodule the lobular artery is increased in size.

As the nodule enlarges it becomes progressively enveloped in a fibrous capsule. This is accomplished at the expense of surrounding lobules. Large vessels are seen on section at the periphery of the nodules. These represent lobular vessels of adjacent lobules which have been compressed. The association between artery and vein is via a simple capillary bed which acts as an arteriovenous shunt. Additional vascularity may be induced by necrosis of a nodule—a response of the surrounding tissue to irritation.

In hyperplastic areas of the nodule capillary sinusoids are noted, which are dilated and tortuous. Giant sinusoidal vessels are sometimes seen. Small arterioles and capillaries may open directly into these sinusoids. This arrangement is interpreted functionally as an arteriovenous shunt.

Perfusion experiments show incomplete filling of the vascular tree in the nodule. This is probably due to shunt mechanism of hyperplastic tissue and the "giant vessels" (sinusoids). Since all the tissues are ultimately nourished, in life, it is postulated that there exists a vasomotor control. Perfusing a normal gland at 200 mm. Hg. fails to cause vascular rupture, but in the nodular gland rupture is frequently noted. This condition probably results from the shunting of perfusing medium into the venous system via the previously mentioned arteriovenous shunts. This is presumably the mechanism of hemorrhage into nodules in vivo. Necrosis in a nodule is conceived as developing as the result of shunting blood from a part of a nodule to a hyperplastic locus. —*Richard L. Lawton, M.D.*

Corticotropin (ACTH) in Hyperthyroidism. CARL P. SCHLICKE and F. ROBERT BERGHAN. *Arch. Surg.*, 1954, 68: 800.

THE relationship between the thyroid and the adrenal glands is discussed. Corticotropin and cortisone have been used in various forms of thyroid disease. The symptoms described after the use of corticotropin in hyperthyroidism are largely due to broad antistress effects, although corticotropin may offer some special antagonism to thyroid and pituitary function.

Corticotropin and cortisone have proved to be useful adjuncts in the managements of many surgical problems, especially in the prevention of thyroid crises. It is also a help in the surgery of patients suffering from hyperthyroidism which has failed to respond to conventional management.

The article is accompanied by a number of charts and tables from 7 case histories.

—*Richard J. Bennett Jr., M.D.*

The Surgical Treatment of Lingual Thyroid. GRANT E. WARD, JAMES R. CANTRILL, and WARD B. ALLAN. *Ann. Surg.*, 1954, 139: 536.

COMPLETE failure of migration of the median anlage of the thyroid from its origin in the base of the pharynx will result in thyroid tissue located at the base of the tongue between the epiglottis and the circumvallate papillae. The terms lingual thyroid and lingual goiter should be reserved for this circumstance. Strict criteria for diagnosis include either histologic confirmation of the tissue or the development of hypothyroidism after removal of the lesion. A recently added third diagnostic test is concentration of radioactive iodine by the tumor. At least one of these criteria must be met, in addition to exact localization of the lesion, before the tumor can be classified as lingual thyroid.

Although the lesion is rare, it is seen often enough to justify a more definitive therapeutic regimen. Several considerations influence the establishment of a rational basis for therapy. A primary consideration is the presence or absence of thyroid tissue in the normal cervical position. The thyroid is derived from three primitive sources—the median and two lateral cell groups which normally migrate to the cervical region. The role of the individual elements in the composition of the definitive gland has not been clearly shown, and the fate of the lateral masses is uncertain. The patient with complete failure of migration of the median anlage should make a good control in evaluating this problem. There is evidence that the lateral masses may in some instances persist as definitive structures, but autopsy examination or cervical exploration showed an absence of cervical thyroid tissue in 28 of 36 cases, so it would seem that the lateral anlage derivatives are inconstantly present, at best. Of more practical significance is the degree of function which may be anticipated from such remnants. Radioactive iodine tracer studies on 8 known cases revealed no cervical thyroid tissue in 7 of the 8, thus indicating no functioning cervical thyroid tissue in the majority of cases.

Another factor is that of the pathologic interpretation of these tumors and, more specifically, the possibility of malignancy. There is little evidence that the tumors become malignant, but the majority of them produce local symptoms and are removed at an early age. All the reported cases of malignancy confirmed by metastases were noted in middle age, which suggests that these lesions, if untreated, may progress to malignancy.

While the diagnosis of lingual thyroid has been simplified, therapy has remained in question. In view of the questionable pathologic interpretation of these tumors it would seem unwise to leave them in situ. The same objection applies to medicinal treatment and to the use of radioactive iodine. None of these methods has proven entirely satisfactory, although experience with radioactive iodine is limited.

With these points in mind the treatment of choice would seem to be complete removal. Autotransplantation seems inadvisable, because of the malignant potential of the tissue. Hypothyroidism, which follows most instances of complete removal, is easily controlled with thyroid replacement therapy. Proper surgical approach to the removal of these tumors makes the procedure no more hazardous than other routine surgical procedures in the head and neck region.

The majority of such tumors have been removed by the oral approach, with modifications in technique introduced to increase exposure. Despite the variations, the oral approach provides inadequate exposure with inadequate control of bleeding. In a smaller number of cases the transhyoid approach has been utilized. While superior to the oral route, the transhyoid approach is inferior to the lateral pharyngotomy.

The lateral pharyngotomy is advantageous in that the approach, and the region, are familiar to the majority of general surgeons since the features are those encountered in the various types of neck dissection. The pharynx may be opened as widely as necessary. The tongue and the tumor may be displaced into the wound and the dissection performed under full view with direct control of bleeding. Reconstruction of the pharynx presents no problem, and antibiotic therapy minimizes the hazards of infection. The dangers of the oral route are eliminated, and technically the approach is superior to the transhyoid operation.

Two case reports are included.

—*Fletcher Austin, M.D.*

Primary Hyperparathyroidism: 5 Cases in One Family. RICHARD N. FROHNER and JOHN C. WOLGAMOT. *Ann. Int. M.*, 1954, 40: 765.

THE rare occurrence of familial hyperparathyroidism has been reported previously in 3 families. The present report is that of a fourth family in which 5 members developed symptoms of hyperparathyroidism, and in each case, single or multiple parathyroid adenomas were resected.

The patients, all residents of Montana, were: a 25 year old woman with a right lower pole adenoma, a 25 year old younger sister of the first patient with a right lower pole adenoma, a 29 year old brother with adenomas of the left and right lower poles, a 30 year old sister with adenomas of the right and left upper poles, and a 26 year old sister with adenomas of the left and right upper poles. The ages are given at the times the disease was treated in each patient.

The father had died at 63 years of age, after 15 years of complaints of nocturia, polyuria, weakness,

and kyphosis. The mother and 2 other younger siblings are well. Laboratory studies at this time are normal, although the serum phosphorus levels are a low normal in the mother and in one sibling.

—Leonard D. Rosenman, M.D.

Primary Hyperparathyroidism with Parathyroid Adenoma; 2 Cases with Metabolic Studies. D. EMSLIE-SMITH and J. GREEN. *Brit. J. Surg.*, 1954, 41: 467.

THE present report deals with the clinical aspects, and particularly with metabolic studies in 2 cases of parathyroid adenoma with consequent development of hyperparathyroidism.

One patient was a 40 year old female who had suffered marked weakness, pain in the hips, knees, and neck, and a pathological fracture. The other patient was a 67 year old woman who also suffered marked fatigue and painful knees. Both patients exhibited the usual changes in calcium and phosphorus metabolism although the second patient had no increase in phosphorus excretion, which was thought to be the result of impairment of renal function. In the first patient the adenoma was found in the right inferior parathyroid. She made an uneventful recovery from the operation. In the instance of the second patient the tumor was not found at operation despite a superior mediastinal exploration. This patient died, and at autopsy the tumor was found to lie immediately inferior to the lower pole of the right lobe at the thyroid. In retrospect, an x-ray shadow seen in the right upper mediastinum was believed to have been caused by the tumor.—*Benjamin F. Lounsbury, M.D.*

Adenomas of the Parathyroid Glands; 12 Cases Treated Surgically. POUL FOGH-ANDERSEN. *Acta chir. scand.*, 1954, 107: 321.

PRIMARY hyperparathyroidism due to adenoma formation of the parathyroid glands is not a rare condition, being found in 4 to 8 per cent of all patients with concretions in the renal tract. The author described 12 cases of primary hyperparathyroidism, 4 of which were discovered by systematic examination of 78 patients under treatment for urolithiasis—a frequency of 5 per cent.

It appears that this condition is probably far more common than it was considered only a few years ago. In 1950, Rienhoff stated that the total number of cases reported had increased to 597.

A true impression of the frequency of hyperparathyroidism is difficult to obtain, as probably a very small proportion of the existing cases are diagnosed because the clinical picture in the early stages is so varied. In addition to the classical skeletal changes, as sequelae of decalcification, the renal symptoms due to the excretion of calcium have shown themselves to be of particular significance in revealing hitherto unrecognized hyperparathyroidism.

The author has performed systematic examinations for hyperparathyroidism on all patients with urolithiasis and found 4 cases among 78 patients with calculus formation during the past 2 years, a frequency of 5 per cent. The examination consisted mainly of repeated estimations of the serum calcium, serum phosphorus, and alkaline phosphatase, together with quantitative estimations of the urinary calcium, after a calcium-free diet for 3 days. In addition to intravenous urography in suspicious cases, roentgen examination of the skeletal system was undertaken. The renal form of the disease consists particularly of ordinary concretions in the urinary tract, and particularly of diffuse calcinosis of the kidneys with reduced renal function and polyuria.

The 12 case histories reported by the author illustrate the varied clinical picture of primary hyperparathyroidism. There were 8 females and 4 males, their ages varying from 29 to 69 years; about half were between 45 and 60 years of age. Seven of the patients had urinary tract symptoms and 2 had skeletal symptoms. Three patients were admitted because of peptic ulcer. Four of the 12 patients had peptic ulcer symptoms.

The great difficulties encountered in surgical treatment were confirmed by the author. In 1 of the cases three attempts were made before the adenoma was successfully removed. The tumor was situated in the mediastinum immediately above the bifurcation of the trachea. Two patients presented 2 or more adenomas and in 1 patient malignant transition was demonstrated. There was no mortality among the 12 patients operated upon. The author emphasizes the importance of early surgical treatment, however, before irreparable changes occur in the kidneys.

—Donald M. Clough, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Delayed Traumatic Intracerebral Hemorrhage: Traumatische Spaetapoplexie. KENNETH G. JAMIESON. *Austral. N. Zealand J. Surg.*, 1954, 23: 300.

THE author presents 2 cases of delayed traumatic intracerebral hemorrhage, with recovery in 1 case and death in the other. Both cases were diagnosed by means of special roentgenological investigations, arteriograms, and/or ventriculograms, and both lesions were verified by operation. In the case of the patient who died, no autopsy was performed. In both cases severe changes developed in the state of consciousness within 10 days after a relatively minor head injury, and in both a clotted intracerebral hematoma was demonstrated in the frontal lobe.

The author speculates that these lesions were purely traumatic in nature, probably secondary to traumatic softening in an arterial wall. Jamieson points out that one should be alert for this unusual complication of a relatively minor head injury.—*Joseph Ransohoff, M.D.*

The Bases of the Treatment of Aneurysms Developing at the Level of the Posterior Wall of the Supraclinoid Portion of the Intracranial Carotid, Principally at the Stage of Rupture; 7 Cases (Les bases du traitement des anévrismes développés au niveau de la paroi posterieure de la carotide intragranienne supraclinoïdienne principalement au stade de rupture). J. BONNAL, J. PELLEGRIN, and R. SEDAN. *Presse méd.* 1954, 62: 810.

THE authors report their observations on 7 cases of subarachnoid bleeding due to aneurysms of the posterior part of the intracranial portion of the carotid artery. They state that the rupture of an aneurysm of the circle of Willis is of such gravity that surgical intervention is justified whenever the condition of the patient deteriorates in spite of medical treatment. Surgical intervention may consist of a direct attack on the aneurysm or ligation of the carotid artery in the neck. If done in the first few days either method may carry a heavy mortality. Not only must the presence of subarachnoid or intracerebral or subdural bleeding be considered but also the intense vasoconstriction which follows a subarachnoid hemorrhage. The problem of double circulation through the vertebral and carotid systems and the problem of prepeduncular hematomas which may cause an obstructive hydrocephalus may also be important as well as involvement of the oculomotor nerve.

Of the first 4 patients, 2 were treated by intracranial intervention and 2 by carotid ligation. Only the first one treated by intracranial intervention survived. The fifth patient had his carotid artery ligated on the thirtieth day when he had symptoms of headache, and he became hemiplegic after ligation. The last 2 carotid ligations were done to prevent a recurrence and the patients have done well. All of the 7 aneurysms were saccular and visible on carotid arteriograms. In 5 of the 7 the neck of the aneurysm was visible and was located below the bifurcation. The anterior choroidal artery was visualized in 6 of the 7, and the aneurysms were below this vessel and seemingly at the level of the posterior communicating artery. However, it would seem to be important to know the site of origin of the aneurysm in relationship to the posterior communicating artery because of the circulation through this vessel. Vertebral arteriograms were not done in this series.

Two signs warrant particular attention in the progress of patients with aneurysms in this area—progressive coma and aneurysms of the pyramidal tract. The progressive coma may be explained on the basis of compression of the peduncles and hypothalamus by the basilar hematoma and the hydrocephalus. The authors do not believe that these hematomas ex-explain all of the deaths in that they have seen hemorrhages into the temporal lobes and ventricles which will cause death as well as hypothalamic ischemia. To all these factors must be added the intense vasoconstriction which is most pronounced at the level of the aneurysm and may be quite localized. It probably serves as a protective mechanism. Such spasm was noted in 5 cases. This spasm may favor the development of hemiplegia after carotid ligation, especially when it is done during the acute stage of the illness.

In this series, 5 patients were treated by carotid ligation with 2 deaths, 1 hemiplegia, and 2 good results. Two were treated by intracranial intervention with 1 death and 1 good result. The authors believe that in the case of the patient who has an aneurysm in this area and is becoming worse, carotid ligation is contraindicated and, although fraught with danger, intracranial intervention, under hypotensive anesthesia, offers the best chance of cure, especially insofar as evacuation of the perianeurysmal hematoma is concerned. However, in the case of the patient in the chronic stage without evidence of vasospasm or possible vertebral supply to the aneurysm, carotid ligation is a worthwhile procedure.—*Nicholas Wetzel, M.D.*

The Fate of Visual Fields and Optic Discs in Pituitary Tumors. O. HIRSCH and H. HAMLIN. *Am. J. Ophth.*, 1954, 37: 880.

THE authors review their personal series of pituitary tumors and compare them with those previously recorded in the literature. In the utilization of the transsphenoidal approach to pituitary tumors the authors demonstrated that an enlarged sella revealed by x-rays was not infallible for the diagnosis of pituitary tumor, and hence more attention was directed to the visual field and optic disc variations.

In the analyzed series of 59 cases, there were 40 chromophobe adenomas, 14 eosinophile tumors, 2 craniopharyngiomas, 1 chondroma, and 2 cases in which the pathologic diagnosis was not determined. The visual field findings in these 59 cases of varying types of tumor demonstrated that unitemporal or bitemporal hemianopia occurred in 84 per cent, and primary optic atrophy occurred in 89 per cent. Central

scotomas were present in 11 per cent and papilledema was present in approximately 9 per cent. There were smaller percentages of each of the following: homonymous hemianopia, unilateral nasal hemianopia, and postneuritic atrophy. Atypical fields accounted for 7 per cent, but the nature of these was not described. They were always associated with papilledema; such a combination or the presence of postneuritic atrophy dictated against the diagnosis of pituitary tumor. Encephalography and angiography were employed to ascertain the nature of the disease.

From a second series of 287 patients, 58 on whom careful ophthalmic observations had been made and were previously reported by Fischer were selected. Six patients with pituitary tumor showed normal optic discs at the time of the initial examination. The vision of all these patients improved following transsphenoidal operation. The visual fields in these cases included 2 with complete bitemporal hemianopia and 4 with temporal scotomas or slight restrictions. Three of the 6 patients continued to show normal optic discs up to 3 years following operation. The second 3 patients developed postoperative changes of optic atrophy although improved visual function remained. In 1 patient optic pallor was noted 3 weeks following the operation. The development of the pallor in the other 2 patients was delayed for a number of years and was attributed to recurrence of the tumor. The authors ascribe the delay in the development of optic pallor to retrograde atrophy which requires time to become manifest, and they believe that even after successful decompression, the normal disc can demonstrate delayed pallor in the face of compression by tumor. The authors do not analyze the role which recurrence plays in the development of this delayed pallor. In this same series of 58 patients, 32 demonstrated temporal pallor and in 28 of these the postoperative improvement of acuity in vision and of the visual fields persisted; in spite of this the temporal pallor increased in some patients. The causation of the pallor is reviewed as is its relationship to visual acuity.

This article was discussed by Horrax of Boston.

—*W. Eugene Stern, M.D.*

Combined Regional and General Anesthesia for Craniotomy and Cortical Exploration; Neurosurgical Considerations. WILDER PENFIELD. *Current Res. Anesth.*, 1954, 33: 145.

IN A paper presented before the Twenty-Eighth Congress of Anesthetists, Wilder Penfield outlined the principles of local anesthesia in craniotomy for cortical exploration and, in addition, presented the plan of combined regional and general anesthesia in these procedures, developed in conjunction with Pasquet. The latter combination is used either (a) as regional anesthesia with terminal general anesthesia, or (b) as interrupted general anesthesia with regional anesthesia.

Penfield outlines the anatomy of cranial and intracranial pain, pointing out that the scalp, the dural arteries, the dural sinuses, and the bridging veins, as well as parts of the middle cerebral artery, are the regions from which pain can be elicited.

In a discussion of the more basic aspects of anesthesia, the author pointed out that respiration has a representation in various cortical areas. There is also another type of representation in the hypothalamus, and the primary control (related to oxygenation and survival) is situated in the lower brain stem. In view of these facts and the additional knowledge that pain pathways pass directly to the dilencephalon without detour to the cerebral cortex, and that the ganglion circuits essential to consciousness are in the higher brain stem, Penfield points out that in order to abolish consciousness or pain, an anesthetic agent must act, not on the cortex but on the centroencephalic system or other ganglion centers in the higher brain stem.

—*Joseph Ransohoff, M.D.*

Combined Regional and General Anesthesia for Craniotomy and Cortical Exploration; Anesthetic Considerations. ANDRE PASQUET. *Current Res. Anesth.*, 1954, 33: 156.

IN A companion paper to Penfield's, Pasquet goes into more detail, describing the anesthetic techniques developed for patients undergoing craniotomy and cortical exploration.

Generally speaking, the patients may be divided into three groups which require different management.

1. The co-operative patient undergoes the major part of the craniotomy under local anesthesia, and is put to sleep for the closure.

2. The unco-operative adult and the child under 10 cannot tolerate the first phase of the operation while awake. They are therefore anesthetized, awakened, and reanesthetized.

3. Children under 4 years of age and adults who give no co-operation whatsoever at any time are kept asleep at the lightest plane of anesthesia throughout the procedure.

The anesthesia itself may be divided into two main types: (a) regional anesthesia with terminal general anesthesia and (b) regional anesthesia with interrupted general anesthesia.

Anesthesia for the surgical treatment of focal epilepsy calls for a remarkable degree of team work. The use of general anesthesia in the late stages of the procedure and sometimes at the beginning calls for special techniques.

Effective local anesthesia must be supplemented by reassurance and understanding so that the patient may be capable of intelligent co-operation.

The cortex is then in its optimum condition for electrical stimulation and for the recording of brain potentials.

The ideal situation is limited by the development of fatigue and loss of patience. It may be terminated also by a generalized seizure which is spontaneous or produced by an unexpectedly great response to electrical stimulation. The pattern of the attack must be watched and immediate anticonvulsant therapy given. For this emergency pentothal (R), 2.5 per cent, is kept ready and administered whenever the surgeon or electroencephalographer deems it necessary. Usually 2 to 5 c.c. will terminate the actual convulsion.

The procedures which have been described are the eventual outcome of the efforts of the many nurses, surgeons, and anesthetists who have worked in close co-operation with Penfield since he first began this type of work.

—*Joseph Ransohoff, M.D.*

Plastic Surgery for Facial Paralysis. C. R. McLaughlin. *Arch. chir. Neerl.*, 1954, 6: 1.

This English plastic surgeon reviews 83 personally treated cases of permanent facial paralysis unsuited to neurosurgical methods. These include paralysis following radical removal of a malignant parotid gland, certain middle fossa fractures, persistent congenital lesions, birth injuries, and long-standing palsies. Plastic procedures for the treatment of such permanent paralysis as well as temporary measures for slowly recovering incomplete lesions are described. The severe cosmetic disturbance, the dribbling, difficulty of chewing, epiphora, and lagophthalmos constitute the stimulus to the relief for such patients.

In the opinion of this author fascia lata is the ideal material for facial support. The other types of materials which may be used are reviewed and the advantages and disadvantages discussed. When dynamic support is offered to the face, it must also offer static support when the face is in repose. Static support to the forehead or the eyelids is often more satisfactory than dynamic support. When dynamic support is applied to the mouth and cheek it requires patient effort to overcome the difficulty of dissociating and reassociating the functions of chewing and smiling.

Static support may be carried out by fixing the transplanted fascia lata to the corner of the mouth on the paralyzed side as well as more medially to the functioning half of the oral sphincter. The upper point of fixation is the temporal fascia. The technique of operation, briefly described, indicates that some overcorrection is necessary when the procedure is conducted under a general anesthetic to compensate for the lack of tone in the normal musculature. If well judged, this operation will straighten the nose, center the philtrum, and control bulging of the buccinator muscle. It also should restore the normal curve of the cheek.

Dynamic support utilizes muscle transplantation and is applicable when the nerve lesion is irrecoverable, if the patient is over 12 but under 50 years of age and if of sufficient intelligence to make use of the disturbances in expression thereby produced. The author recommends the use of a temporalis transplant secured to a strip of fascia lata. This technique (Fig. 1) and less extensive procedures are described.

A hook fixed to a denture or externally to the ear may lift the corner of the mouth, and an intraoral flange may also be built into a denture to give support to the cheek, but the "face-lift" technique by skin advancement has a limited use. The use of transparent adhesive tape may give temporary support in the case of Bell's palsy or other paralyses with good prognosis.

In the discussion of surgery about the eyelid and forehead, the paralyzed frontalis muscle and sagging eyebrow are thought to be benefited by excising an ellipse of skin and of paralyzed muscle immediately above the affected eyebrow. Eyelid surgery is also described with the objectives of relieving the epiphora, narrowing the palpebral fissure, lessening the lagophthalmos, and preventing corneal ulceration or conjunctivitis due to exposure. Ectropion of the lower lid is best relieved by an overlapping lateral tarsorrhaphy which the author diagrams.

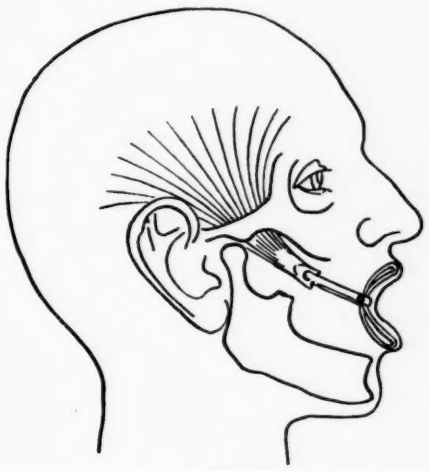

Fig. 1 (McLaughlin).

The average duration of paralysis in this series was 15 years. Sepsis occurred in the fascial graft procedures in 4 per cent of the cases. The photographs of the patients' faces before and after operation are worthy of review. —*W. Eugene Stern, M.D.*

The Sphenoid Bone Syndrome (Keilbeinsyndrom). E. Bues, H. F. Piper, and H. Wolff. *Chirurg*, 1954, 25: 193.

Under the "sphenoid bone syndrome" the authors include tumors and inflammatory conditions affecting the sphenoid bone and the adjacent meninges. Clinical differentiation between neoplasms and inflammatory processes involving the sphenoid bone is not possible on the basis of symptomatology, and since a similar surgical procedure is frequently indicated for both conditions it would appear logical to include them in a common clinical syndrome. This report is based on 15 cases proved at operation; there were 6 meningiomas of the small wing of the sphenoid, 1 meningioma of the tuberculum sellae, 1 cylindroma breaking through the sphenoid bone, and 7 cases of chiasmal arachnoiditis.

The characteristic signs of the syndrome are:

1. Concentric narrowing of the visual field, although this sign may be irregular or absent.

2. Unilateral, nonpulsating exophthalmos (1 case of bilateral exophthalmos was observed).

3. Positive roentgen findings are especially significant. A meningioma may manifest itself by calcified shadows in an area of decreased density or by a reactive sclerosis of adjacent bone, but the changes may be insignificant. The roentgen changes occurring with an inflammatory lesion are usually trifling and less certain.

4. With large tumors there may be changes in the encephalogram and the arteriogram.

It is difficult, if not impossible, to differentiate a tumor from an inflammatory lesion on the basis of these signs. The history of a rapid onset of illness, especially

following an initial infection or trauma, favors inflammation, whereas a more prolonged course suggests tumor. Operation is indicated for the sphenoid bone syndrome whenever progressive impairment of vision occurs, even though there is no evidence of tumor, since good operative results are also obtained in chiasmal arachnoiditis. Conservative measures may be employed in a few patients with insignificant visual disturbance or advanced age. The operative approach through a Dandy flap is briefly discussed. For sphenoid meningioma the operative mortality is given as 14.4 per cent. Lasting benefit was obtained in 3 of 7 cases of inflammation and in 5 of 8 cases of tumor.

—*John L. Lindquist, M.D.*

PERIPHERAL NERVES

Syndrome of Median Nerve Compression in Carpal Tunnel. EDWIN F. LANG, JR. *Surg. Clin. N. America*, 1954, 34: 853.

THE regional anatomy of the median nerve at the wrist is reviewed. The unilateral syndrome of compression may be due to disturbance of the bone, joint, or tendon on the basis of joint disease or injury, acute or chronic. The onset may be immediate or delayed. Recurrent minor trauma, overlooked in the history, may be responsible for the disease process. Unaccustomed wrist movement and manual work conceivably could result in compression of the nerve. Thus, in the position of extension of the wrist, pressure within the carpal canal is increased; during flexion of the wrist there may be intermittent compression of the median nerve against the carpal ligament by the action of the long flexor tendons.

The symptomatic and objective findings of this process are reviewed. It usually occurs in middle-aged women, but is not confined to this group. Sensory symptoms are the earliest in the majority of cases; these include painful paresthesias which are of sufficient severity to disturb sleep. Such paresthesias occur in the distribution of the median nerve in both hand and fingers. Less well localized achings in the wrist and forearm may occur. Neurologic deficit may be slight and delayed in onset and some sensory loss within the median nerve distribution can develop. Local findings of median nerve irritability at the wrist are not invariable, but prominent motor findings are an unusual occurrence.

Operative treatment, which is the treatment of choice, consists of surgical decompression of the median nerve by dividing the transverse carpal ligament over the course of the median nerve. Local changes in the nerve are visualized at the time of operation and consist of evidence of local compression. Such surgical treatment has been highly successful; pain and paresthesias are usually quite promptly relieved. The differential diagnosis is discussed.

—*W. Eugene Stern, M.D.*

Median Neuropathy in the Carpal Tunnel. MILLER FISHER. *Canad. M. Ass. J.*, 1954, 71: 121.

THE recognition of the motor and sensory findings and symptoms that arise from compression of the median nerve as it passes through the carpal tunnel has occurred only recently, although the findings of obscure wasting of the thenar muscles with variable sensory loss has been described for almost 50 years.

Improvement after division of the transverse carpal ligament has been noted when the nerve compression was due to arthritis, acromegaly, or an old injury, and more recently in cases which show no definite change, the so-called "spontaneous" type. Patients affected by this disease characteristically complain of pain and paresthesias developing during sleep and also show signs of median nerve weakness later. The disease may often be bilateral. It must be differentiated from cervical intervertebral disc disease or arthritis with root compression, from the thoracic neurovascular outlet syndrome, and from disease of the cervical spinal cord. It is probably quite common in mild form.

Relief may be obtained by proper splinting and rest in mild cases, but a complete section of the transverse carpal ligament must be done to afford relief to those that fail to benefit from rest. The exact mechanism of the difficulty is not entirely clear but it is probably due to diminution of the size of the carpal tunnel during flexion of the wrist and subsequent damage to the nerve. No disability seems to arise from complete section of the ligament, and it is important that this structure be completely sectioned.

—*Nicholas Wetzel, M.D.*

The Importance of Anatomic Precision in Differential Sacral Neurotomy for "Cord Bladder." J. M. MEREDITH. *Am. J. Surg.*, 1954, 87: 819.

DIFFERENTIAL sacral neurotomy is believed to be a very satisfactory procedure for achieving an automatic bladder in patients with spastic lesions of the spinal cord from trauma or non-traumatic cord lesions such as severe myeloencephalitis. Attention is called to certain anatomic facts with respect to the close approximation of the sacral roots especially at the S2, 3, and 4 foramina in the sacrum as shown by anatomic dissections in the cadaver and also at operation. The practical application of these facts requires that great care be taken both in interpreting the effects of preoperative novocain injections of the different sacral foramina and nerves and in searching for the proper nerve to divide surgically in the individual sacral foramen following novocain injection. The surgeon must take care that the wrong nerve is not injected or divided. By following certain simple anatomic observations, such errors can be readily avoided.

These observations are directed particularly to the occasional operator in this type of case who might otherwise be led astray in interpreting the result of novocain injections and in identifying the appropriate nerve roots for surgical division at the individual sacral foramina.

—*Joseph Ransohoff, M.D.*

SYMPATHETIC NERVES

Radioactive Sodium Clearance as a Measurement of Efficacy of Sympathectomy in Peripheral Arterial Insufficiency. JOHN J. REINHARD, JR., and ELIZABETH DITURI. *Ann. Surg.*, 1954, 140: 67.

IN THE present study, from the Department of Surgery of the Women's Medical College, Philadelphia, the authors utilized the Kety method of measuring a

clearance of intramuscularly injected radioactive sodium. The investigation was made in the cases of 14 patients before and after lumbar sympathectomy for arteriosclerotic peripheral vascular disease, arterial spasm, and chronic venous insufficiency. The authors indicate that the state of arterial sufficiency cannot be determined by a basal sodium clearance rate. Significance is attached to the comparison of the basal clearance rate with the rate obtained either after sympathetic block or after sympathectomy in the same patient. The increase in rate of clearance, or the lack thereof, aids materially in evaluating the elasticity of the vascular tree. When block and sympathectomy give no significant increase in clearance rate, the prognosis for improvement in such a case is poor.

Four patients acted as controls. These patients had normal peripheral arterial perfusion, and following sympathetic block all demonstrated a definite increase in sodium clearance. It is of interest that in 2 of the 4 patients, the increase between the basal and the postinjection state demonstrated was less than that considered to be significant by the authors. According to the table of the 14 patients with arterial disease, 3 demonstrated a significant increase in the sodium clearance from the basal value to the postsympathectomy state. Two additional patients showed a slight, but not significant, increase in their clearance rate.

Four of the 5 patients who demonstrated an increase in clearance rate following sympathectomy improved subjectively and amputation was avoided. The remaining 9 patients showed no increase in clearance rate following operation. In 7 of these the disease progressed; however, in 2 of the 9 patients, improvement was noted even though the clearance rate remained unchanged. The reader is referred to the original article for a perusal of the graphs of this series.

—*W. Eugene Stern, M.D.*

MISCELLANEOUS

Backache and the Disc. G. K. Rose. *Lancet*, Lond., 1954, 1: 1143.

Some 20 years have passed since the "discovery" by Mixter and Barr of the intervertebral disc, which at present is at the pinnacle of its "popularity." Thus a review of the vast amount of fact and hypothesis is in order. A review of the anatomicophysiological and mechanical factors is made and attention is drawn to the fact that in both the cervical and lumbar spine the stability is poor and the muscular bracing is inefficient.

Attention is drawn to the fluid metabolism of the disc and the function of the cartilaginous plate as a semipermeable membrane. The natural history of degenerative change in the disc, especially the changes in the cartilaginous plate versus those in the nucleus pulposus, are discussed in the light of the hydrodynamic and mechanical factors present.

Causes of the signs and symptoms are reviewed and attention is drawn to the fact that the real cause of pain and sciatic radiation are not known definitely, especially since it has been strongly disputed that pressure on a nerve root causes pain. Sclerogenous pain, a term coined by Inman and Saunders, is described and is thought to be one of the major factors in the production of many symptoms, especially as the afferent area may be quite different from the sclerotomal area of referred pain and tenderness. The richest areas of afferent nerve endings are in the posterior ligaments, the annuli, the dura, and the capsules of the intervertebral articulations with the areas of referral in the extremities.

The author does not believe that reduction of prolapse often occurs, but he believes that many cures obtained by conservative measures are due to changes in the nerve itself. Lateral-lying protrusions are least likely to be improved by these measures because of the restricted amount of motility of the nerve in this area. The author thinks that traction may enhance the nerve lengthening process as does any manipulative procedure. Conservative treatment should be directed toward relieving the symptoms and treating the intrinsic lesion. The importance of muscle re-education is stressed, but the author realizes such is not always possible and hence the use of various external supports to give the injured tissues rest. However, in the cervical region immobilization is not in order, but rather traction, diathermy, and manipulation toward increasing mobility. Extrinsic causes of back pain are mentioned in passing. —*Nicholas Wetzel, M.D.*

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Sclerosing Hemangioma of the Breast. W. F. WALKER. *Brit. J. Surg.*, 1954, 41: 603.

THE author reports a case of sclerosing hemangioma of the breast, treated by local surgical excision. Sclerosing angioma is a pigmented tumor of the skin, which is benign and bleeds if injured.

The tumor is uncommon and is rarely found in the breast. These tumors contain an overgrowth of stroma, with abundant hemosiderin and foam cells. Arrangements should be made for accurate diagnosis at the time of operation, because the tumor closely resembles a melanoma. —*S. Lloyd Teitelman, M.D.*

Malignancy Occurring in Cystosarcoma Phyllodes; a Case Report. DONALD E. ROSS. *Am. J. Surg.*, 1954, 88: 243.

THE author describes a case of cystosarcoma phyllodes (usually considered a benign tumor) in which the condition recurred four times, each of which showed an increased degree of malignancy. The tumor resembles a fibroadenoma grossly and microscopically.

The patient described was a 51 year old female who noted a nodule in her breast 2 years prior to surgery. A radical mastectomy was performed and the general appearance of the tumor was that of a fibroadenoma. There was no evidence of malignancy in the epithelial portion, but "evidences of low grade malignancy were noted in the connective tissue component of the tumor."

Eighteen months later, a large recurrence of the chest wall was noted and a roentgenogram of the chest showed penetration into the mediastinum. This recurrent mass was resected, necessitating removal of the middle half of the sternum and a portion of lung edge. The chest wall defect was repaired with tantalum steel mesh and the remaining breast was swung over the defect. Four months later a second chest wall recurrence was excised, which was followed 3 months later by a third recurrence. The last time, the lesion appeared less circumscribed than on previous occasions. Two months after her last surgery, death occurred and an autopsy was not obtained.

The author advises radical mastectomy for these tumors and the same surgical principles that one would employ in dealing with carcinoma of the breast. —*Donald M. Clough, M.D.*

Biopsy in Breast Cancer (Die Probeexzision beim Mammakarzinom). H. STAMM and M. WALLERTSHAUSER. *Geburtsh. & Frauenh.*, 1954, 14: 485.

NO LESS than two-thirds of all patients with breast carcinoma consult their physician the first time after the formation of metastases.

Routine examination of the breasts of all female patients seen by physicians, no matter for what condition, is a valuable aid to early recognition of a malignant lesion. In case of doubt an ambulatory biopsy followed by a painstaking histologic study leads not only to the correct diagnosis but also to therapeutic suggestions, especially in borderline cases. In no instance do transcutaneous thermotopographic measurements, local histochemical studies, cytologic staining of the secretion expressed from the nipples, nor roentgenograms of the breast lead to the determination of the character of the tumor.

The danger of dissemination of metastases by a biopsy has been overemphasized. Hospitalization of all patients undergoing biopsy, which would allow an immediate radical operation if malignancy is found, is not feasible because of the shortage of beds. Approximately 80 per cent of early recognized tumors suspected to be malignant prove to be benign. It follows that a very high percentage of patients undergoing biopsy would be hospitalized unnecessarily. In the Gynecologic Hospital of the University of Basel no iatrogenic dissemination of metastases could be demonstrated in a series of 24 patients in whom an ambulatory biopsy had been performed, although the period between this procedure and the radical operation ranged from 1 day to as long as 7 weeks.

Biopsy should be done in such a manner that the incision is carried through normal tissue.

Precancerous lesions are encountered in polypoid intracanalicular fibroadenomas and cystic mastopathy more frequently than in other types of tumors. Both aforementioned lesions also are frequently associated with carcinoma semiadenomatosum or carcinoma adenomatosum intracanaliculare. Both of these types of cancer occur with the greatest frequency in relatively young women.—*Joseph K. Narat, M.D.*

Treated, Compared with Untreated Breast Cancer; 100 Cases of Fischel Versus 100 Cases of Daland. E. LAWRENCE KEYES, M. DAVID ORRAHOOD, and HERMAN T. BLUMENTHAL. *Arch. Surg.*, 1954, 68: 820.

AN ANALYSIS was made of 100 cases of verified infiltrative carcinoma which had undergone radical mastectomy (Halsted) from 1928 to 1944; 34 of these patients had had postoperative irradiation and some had also received hormones. This group was compared with 100 untreated patients who had died of breast cancer.

Whereas the mean survival time of untreated patients was found to be 3 years and 5 months, treated patients survived 6 years and 1 month after onset. Hence, mastectomy almost doubled the life span. Furthermore, 21 of 100 patients survived 10 years after mastectomy, whereas only 5 survived 10 years after onset of the disease.

Mastectomy added 4½ years to the life span of patients 45 to 50 years of age. Much less responsive was the group older than 60, only 3 months being added.

Treatment, not parturition, was the factor which prolonged life, since the survival period after radical mastectomy for mothers was similar to that for those who were childless. Similarly, mothers untreated survived as long as women untreated who were childless.

The mean survival time for patients undergoing early mastectomy (within 1 month of onset) was 6½

years as compared to a mean survival time of 6 years when operation was performed later (from the second to the sixth month after onset). "Very late" mastectomy, on the other hand, never prolonged life more than 3 years postoperatively. Mastectomy yielded 2 years' longer survival of patients with cancer "limited" to the breast (stages 1, 2, and 3) than for those with cancer "locally advanced" in the breast to ulceration, skin metastases of the breast, or extensive edema of breast skin (stage 4). Indeed, patients in stage 4 lived only 1 month longer after radical mastectomy than did those who remained untreated. Skin dimpling or nipple retraction was associated with a decrease of 2 years in survival time. Bleeding or discharging nipple also reduced survival time to 2¾ years.

Patients with axillary metastases at mastectomy survived 2½ years less than those free of invasion. With bone metastases, mastectomy added 1 year to the life span, irradiation being credited in part for this increase in longevity. Mastectomy also added 1 year to the life span even in the presence of liver metastases. However, life was only 1 month longer for patients who postoperatively developed subcutaneous metastases than it was for untreated patients. Nevertheless, patients were prevented, through treatment, from dying with ulcerative cancer on their chest.

Patients with differentiated carcinoma outlived patients with undifferentiated carcinoma after mastectomy by 2½ years and patients with papillary carcinoma outlived by 3½ years patients with scirrhous carcinoma.

Of the entire series of 100 patients treated by resection, 3 died postoperatively and 68 died of metastatic breast carcinoma by the fifteenth postoperative year. Thus, radical mastectomy failed to cure breast cancer in 71 patients. In addition, 14 patients, unfollowed from 2 to 15 years since operation, have been considered dead because lost to follow-up. One patient died 14 years postoperatively, free from metastatic breast carcinoma. Thus, radical mastectomy has "cured" temporarily 14 patients who have survived clinically well (to date) from 10 to 23 years postoperatively.

The "curability" rate at 10 years, when borderline cancer was excluded, was 21 per cent; the percentage dropped to 19 when inoperable cases were included.

—David H. Lynn, M.D.

Extended Exeresis of the Regional Lymph Nodes at Operation for Carcinoma of the Breast and the Result of a 5 Year Follow-Up of the First 98 Cases with Removal of the Axillary as Well as the Supraclavicular Glands. M. ANDREASSEN, E. DAHL-IVERSEN, and BØRGE-SØRENSEN. *Acta. chir. scand.*, 1954, 107: 206.

THREE series of investigations have been carried out by these authors in an attempt to determine how often the ordinary radical operation for carcinoma of the breast is not actually a radical one when both the supraclavicular and parasternal nodes are left.

The first series consisted of 98 consecutive cases. The patients were operated upon during the period from 1947 to 1949, and the supraclavicular nodes as well as the axillary nodes were removed. This series of cases was reported in 1949 and the present contribution consists of a 5 year follow-up of these 98 patients.

The second series, consisting of 53 patients, was originally reported in 1951 and in this group both the axillary and parasternal nodes were removed.

The third series, reported in 1952, consisted of 76 patients in whom both the supraclavicular and parasternal nodes as well as the axillary nodes were resected. Five-year survival rate in the second and third groups cannot be reported as yet.

Within the last 10 months the authors have operated upon an additional 100 patients in whom the axillary, supraclavicular, and parasternal nodes were resected. There has been no increase in the mortality rate from the more extensive procedure. A careful breakdown of node metastases.

The follow-up findings in the first series of patients operated upon between 1947 and 1949 are discussed in detail. Of the 98 patients operated upon, 47 had no metastases to the axillary nodes and 51 had microscopic evidence of metastases. All patients had received roentgen therapy to the axillary, supraclavicular, and parasternal areas postoperatively. None of the patients without axillary metastasis had supraclavicular metastasis. Of the 51 patients with metastasis to the axillary nodes, 17 (33%) also had supraclavicular metastasis, and 11 of the 17 patients were operable according to Haagensen's criteria.

There were 12 recurrences among the 47 patients without evidence of metastasis at the time of the original surgery, a freedom from recurrence of 74 per cent. There were 40 recurrences among the 51 patients who had evidence of metastasis originally, a freedom from recurrence of only 22 per cent. Of the 17 patients who showed microscopic evidence of metastasis to the supraclavicular nodes, 3 were without recurrence. The remaining 14 patients had died from 6 months to 4 years after operation.

The authors conclude that removal of the supraclavicular nodes in addition to the axillary nodes does not improve the 5 year survival rate, since the 22 per cent freedom from recurrence is no better than that for other reported series in which the supraclavicular nodes were not removed. They also conclude that although their series is small, the presence of metastases to the supraclavicular nodes cannot be considered a criteria of inoperability since there is an 18 per cent freedom from recurrence after 5 years in this group.

—John H. David, M.D.

Radium Therapy in the Treatment of Recurrences of Cutaneous and Regional Lymph Gland Metastases from Carcinoma of the Breast Treated by Surgery; Results Obtained in 332 Cases in the Decade 1939–1948 (La radiumterapia delle recidive e delle metastasi cutanee e linfoghiandolari regionali del carcinoma della mammella operato; risultati conseguiti in 332 casi nel decennio 1939–1948). FRANCO FOSSATI. *Tumori*, Milano, 1954, 40: 217.

IN THIS SERIES, all cases of carcinoma of the breast were resected surgically. The extent of surgery, the histologic type of the tumor, and whether or not roentgen therapy was used originally is not elaborated upon. The author's study is limited to the survival period after radium therapy for recurrence following surgical resection. Of the 332 patients observed during the period from 1939 to 1948, 6 were males.

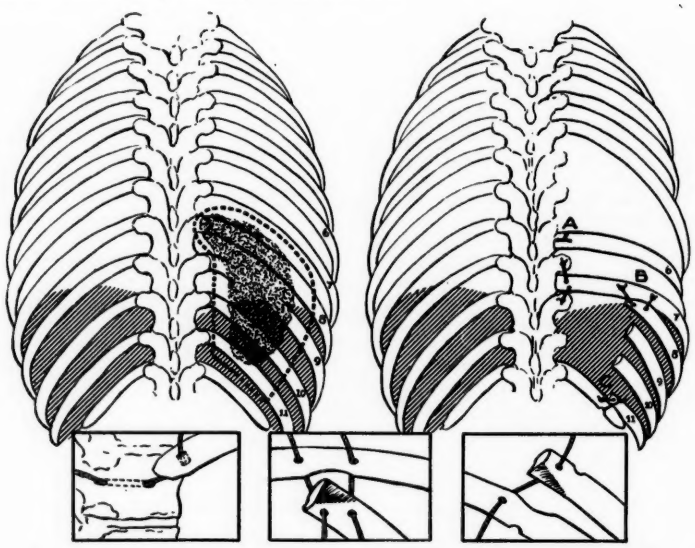

FIG. 1 (Specht *et al.*). Diagram on left shows defect created by tumor excision. Method of repair is shown on the right. Details of rib fixation are illustrated by inserts *a*, *b*, and *c*. Parietal pleura, periosteum, and intercostal muscles were mobilized up to the second rib and brought down to close the pleural defect.

The entire series is divided into four groups. In group I, there were 88 cases (26.5%) in which there was a local recurrence of neoplastic tissue in the immediate confines of the previous surgical incision. Group II consisted of 118 cases (35.5%) in which there was evidence of regional lymph node involvement. There were 79 cases (24%) of combined local and regional metastatic involvement which were placed in group III. All of these patients were treated with topical radium therapy. Group IV consisted of 47 cases (14%) in which radium therapy was combined with surgical excision of the local or lymph node involvement, and in the last few years hormone therapy had been used as adjuvant therapy to the radium.

The results are analyzed on the basis of survival at the end of a 5 year period beginning at the initiation of radium therapy. Survivals after 5 years were as follows: 12.5 per cent in group I; 13.5 per cent in group II; 7.6 per cent in group III; and 14.8 per cent in Group IV.

The author concludes that the best results were obtained in the group IV series, in which radium therapy was combined with surgical excision of the local and metastatic recurrence.

—*Roland A. Manfredi, M.D.*

Rhabdomyosarcoma of the Chest Wall. ROBERT C. SPECHT, JAMES H. WALKER, and HENRY H. FAXON. *Arch. Surg.*, 1954, 68: 687.

FOLLOWING a review of the literature, the authors present an additional case of rhabdomyosarcoma of the thoracic wall. Their patient was a 65 year old white male with a 5 month history of fleeting soreness and a mass in the left thoracic back. Physical examination was normal except for the back. There was a 12 cm. round, firm, nontender mass over the ninth, tenth, and eleventh ribs to the left of the midline posteriorly. The mass appeared to be attached to the ribs and paraspinal muscles. The skin over it was movable. Roentgen films showed complete destruction of approximately 8 cm. of the vertebral end of the ninth rib, with a large well-defined overlying tissue mass. The mass was excised. Since the skin was not attached to the mass, none was removed, but a block of muscles overlying and containing the mass, together with portions of four ribs (the eighth, ninth, tenth and eleventh) and the overlying pleura were excised. The large defect of bony thorax thus created was then bridged by detachment of the sixth and seventh ribs posteriorly. They were then brought down and attached to the transverse processes and body of the lower vertebrae (Fig. 1).

The postoperative course was uneventful. The chest wall closure provided adequate support, and there was no bulging or paradoxical motion on coughing or straining. One year after operation the patient was entirely well. There was no evidence of local recurrence or distant metastasis on physical examination or on x-ray of the chest. —*Harold L. Method, M.D.*

Surgery of the Thymus Gland; Second and Third Thoughts. GEOFFREY KEYNES. *Lancet*, Lond., 1954, 1: 1197.

SURGERY of the thymus gland has centered around its association with myasthenia gravis, and this began

many years ago with the observation that tumors of the thymus were often accompanied by the symptoms of myasthenia. Removal of these tumors proved to be difficult, and it was not until 1936 that BLALOCK, an American cardiac surgeon, successfully removed a thymoma with alleviation of the associated myasthenia gravis. A few years later he took the further logical step of removing the apparently normal thymus gland from myasthenic patients, since most of them do not have a tumor to account for the disease, and in 1941 he reported favorably on the results obtained in 6 patients.

The author's experience with surgical removal of the thymus gland for myasthenia gravis began in 1942. The result provided encouragement for further operations of this type, and within the next 3 years 50 thymectomies had provided a considerable body of experience on which to base some assessment of the results likely to be obtained. By July 1949 there were 120 cases available for assessment.

The clinical manifestations of myasthenia gravis vary greatly. For evaluation of thymectomy, four categories were recognized, as follows: (a) quite well, i.e., normal life without neostigmine; (b) greatly improved, but requiring some neostigmine; (c) somewhat improved, but requiring less neostigmine than before; (d) no improvement. The investigation disclosed that 39 patients (32.5%) were well, and proper for classification in group *a*; 40 (33.3%) were classified in group *b*; 31 (25.8%) were classified in group *c*; and 10 (8.3%) were found to belong to group *d*.

Since 1949, with more than 200 patients without thymomas to be assessed, the results have remained about the same, or slightly better. An independent investigation of 100 of the author's patients by R. T. Ross, in 1951–1952, showed 41 of 93 to be in category *a*, with 26 in category *b*, i.e., an excellent result in 67, or nearly 70 per cent. The average period of follow-up by this time was 4½ years. In a recent evaluation, 2 years later, no significant changes were noted in the evaluation by an independent observer, J. A. SIMPSON.

A critical analysis is presented of reports by the Mayo Clinic and the Johns Hopkins Hospital on the treatment of myasthenia gravis, by thymectomy.

The thymoma is considered to be the foundation on which the surgical treatment of myasthenia gravis was based. It is believed that the disordered neuromuscular mechanism known as myasthenia gravis is connected with the growth of an epithelial tumor of the thymus. These tumors are not common but the author has studied 41 of them. About 15 per cent of myasthenic patients are found to have thymic tumors and these cases are far more serious than the other 85 per cent without tumors. The initial results with primary surgery were poor, but the substitution of high-voltage x-ray therapy with subsequent removal of the tumor improved the results markedly. Removal is also recommended to obviate malignant degeneration of a tumor.

The author discusses the laboratory and pharmacologic studies of ANDREW WILSON at Liverpool University, on the thymic extract removed from human specimens.

It is concluded that epithelial tumors of the thymus are usually associated with a specially virulent form of neuromuscular failure, that a large proportion of myasthenic patients are permanently and often completely relieved of their symptoms following thymectomy, and that these thymus glands can be made to yield a potent extract which has a specific nerve-blocking effect ordinarily obtained with tubocurarine. The author believes that thymectomy offers the best hope for relief from myasthenia gravis.

—*John H. Mohardt, M.D.*

TRACHEA, LUNGS, AND PLEURA

Experimental Reconstructive Surgery of the Trachea. CARLOS R. PACHECO, OCTAVIO RIVERO, and JOSÉ KUTHY PORTER. *J. Thorac. Surg.*, 1954, 27: 554.

THE authors present several experimental methods of repair of the trachea in the dog. These included section and end-to-end anastomosis, homotopic autografts, homotopic homografts, heterotopic autografts, and platelike heterotopic grafts. All specimens were subjected to macroscopic and microscopic study.

In those instances of section and anastomosis in which silk was used, stenosis to complete obstruction occurred, with evidence of intense inflammatory reaction and loss of mucosa at the suture line. With the use of stainless steel wire sutures, there was no stenosis, new mucosa formation, and practically no evidence of inflammation. With homotopic autografts, the use of silk resulted in stenosis, inflammation with pus formation, and necrosis with loss of mucosa and cartilage. In one instance in which steel wire was used, good healing occurred with no stenosis or inflammation, while in the other 2 instances, stenosis and infection developed. With partial circumferential tracheal excision, leaving the posterior longitudinal ligament intact, or with excision of only the ligament, leaving the tracheal rings intact, there was good healing without stenosis.

With homotopic homografts preserved in alcohol and sutured with silk, complete stenosis and replacement by fibrous tissue resulted. Where fresh grafts with silk and steel sutures were used, either stenosis or destruction of the graft occurred. Grafts preserved in saline or treated by lyophilization were either stenotic or destroyed. Heterotopic autografts with cartilage from the animal's ear were destroyed or collapsed with infection. Platelike heterotopic grafts showed no stenosis. The cartilage was found to be degenerating microscopically and was covered with inflammatory tissue. The longer the period after operation, the less inflammation and the more epithelization was noted.

The authors conclude that stainless steel sutures should be used to prevent leakage at the anastomosis because they are stronger. This prevents subsequent infection from the contaminated air passages. Both nutritional and infectious factors are very important in tracheal repair. Homografting was unsuccessful because of incompatability between graft and receptor. Heterotopic autografts were not successful because of collapse and retention of secretions with superimposed infection. Platelike grafts were successful because the defect produced in the trachea was small and the graft acted as a scaffold; therefore, homografts are not advised in repairing large defects although in small

defects either heterotopic autografts or homografts can be used. —*Victor M. Bernhard, M.D.*

Alterations in Respiratory Physiology Associated with Thoracic Injury; Brief Comments on Treatment. HOWARD K. GRAY. *Med. Clin. N. America*, 1954, 38: 1183.

THE only fundamental difference between the treatment of trauma of the thorax and the treatment of trauma in other regions of the body is based on the altered respiratory physiology in the former. A general knowledge of respiratory physiology is essential if adequate therapeutic procedures are to be instituted.

In the normal person a negative pressure exists in the potential space between the visceral and the parietal pleura and it varies with inspiration and expiration, the average variation between respiratory excursions being 4.5 mm. of mercury. Negative intrapleural pressure is important because it maintains the pleural surfaces in apposition as well as the expansion of the lung, which promotes the return of venous blood to the heart.

When either pleural surface is punctured, atmospheric air is permitted to enter the pleural space and pneumothorax exists. If the communication is only through the bronchial tree, it is termed "closed pneumothorax." If an atmospheric communication exists through the thoracic wall, it is termed an "open pneumothorax."

The complications that result from a closed pneumothorax are caused by a forced expiratory effort against a partially or fully closed glottis. In coughing or sneezing, air is forced through the aperture in the bronchus or one of the smaller bronchioles which communicates with the pleural space and causes the development of pressure which may be many times the atmospheric pressure. As a result the lung on the affected side becomes contracted and compressed, and the mediastinal structures are shifted toward the unaffected side with partial compression of the lung on that or the unaffected side. The diaphragm is displaced downward and acute dilatation of the stomach may occur. The identical disturbances may occur with the spontaneous rupture of an emphysematous or bullous bleb.

Two serious complications follow open pneumothorax: (1) the negative intrapleural pressure is lost, which permits the lung to contract, and (2) there is a varying degree of obstruction to the return of venous blood to the heart. If the opening in the thoracic wall is smaller than the opening of the glottis the intrabronchial air will continue to aerate the lung in its partially contracted state and respiratory effort will be minimal. Only partial contraction usually occurs on the affected side because insufficient time elapses for outside air to enter the pleural space through the small aperture in the thoracic wall before expiration forces it out. Tension pneumothorax does not develop because the tension in the pleura cannot rise above atmospheric pressure except momentarily during forced expiration. The pumping action noted in closed pneumothorax is absent for there is no communication with the intrapulmonary air passages in open pneumothorax; consequently, the only source of air is through the thoracic wall, and pressure against a closed glottis does not add any more air to the pleural space than that which enters under ordinary atmospheric pressure. Almost complete contraction of the lung on the affected side may occur, however, because of the obliteration of the negative pressure within the pleural space. Minimal swing of the mediastinal structures occurs but is not as significant as when the opening in the thoracic wall is large.

When the aperture in the thoracic wall is greater than the opening of the glottis the lung is contracted to a greater degree. On inspiration the structures contained in the mediastinum are displaced toward the normally ventilating lung by inrushing air under atmospheric air into the pleural space to compensate for the increase of intrathoracic volume which occurs during inspiration. Consequently, the degree of expansion of the unaffected lung is diminished with reduction of its functioning volume which results in instability of the mediastinum practically to the point of paradoxical respiration. On expiration, the reverse ensues and the mediastinum is drawn back toward the midline. The flutter or swing of the mediastinum interferes with the return of venous blood to the heart by moderate angulation of the great vessels, especially the superior and inferior venae cavae. Because one of the major factors in the volume of cardiac output is the volume of cardiac intake or venous return, diminution of venous return is an extremely important step toward failure of the circulation of an adequate quantity of blood. The chain of events resulting from a large open pneumothorax may have a lethal outcome if these abnormal physiologic processes are not corrected rapidly.

In addition to these unique physiologic reactions which apply to thoracic injuries, the usual factors involved in the production of shock are operative also, for trauma of such magnitude as to produce pneumothorax may be sufficient in itself to produce shock. A patient usually can tolerate a large open pneumothorax if the functional efficiency of the contralateral lung is not impaired by empyema or inflammatory disease, if the circulatory system is free of disease so that it can tolerate the increased burden imposed by the physiologic loss of one lung, and if the mediastinum is fixed so that to and fro motion does not occur.

The mechanism, effects, and treatment, with illustrations of subcutaneous and mediastinal emphysema, stove-in chest, hemothorax, and traumatic and hemorrhagic shock are discussed.

—*John H. Mohardt, M.D.*

Daniels' Biopsy in the Diagnosis and Treatment of Pathologic Processes in the Lungs and Mediastinum. K. K. M. F. SEGHERS, N. G. M. ORIE, H. N. HADDERS, and J. M. MINDERHOUT. *Arch. chir. Neerl.*, 1954, 6: 57.

SYNOPSES of methods for obtaining a pathologic specimen in cases of diffuse or miliary pulmonary diseases and mediastinal tumors are given. Daniels' biopsy must be considered an important additional method, and the technique is briefly described. The deep supraclavicular lymph glands are the first glands involved after the hilar glands, and Daniels' biopsy consists of surgical removal and the study of these glands. The glands to be removed lie in a fixed

position, embedded in a lump of fat, and situated in a triangle bounded medially by the internal jugular vein, caudally by the subclavian vein, and laterocranially by the connecting tendon of the omohyoid muscle.

Daniels' method of diagnosis was used in 197 cases. In 4 cases no lymph nodes were found; in 98 cases the lymph nodes were normal. The results were negative in 102 cases and positive in 95 cases. There were 75 cases of sarcoidosis and 9 cases of malignant lymphogranuloma.

Daniels' biopsy was also applied as a means of determining operability in cases of bronchogenic carcinoma. In a series of 132 cases of suspected or proved bronchogenic carcinoma (without palpable lymph glands!) selected at random, 14 positive results were obtained. The authors consider this another important field in which the method should be applied, as in these cases the patient may be saved a major operation. In other types of diffuse pulmonary lesions, including silicosis, positive results were only exceptionally obtained. —*John J. Maloney, M.D.*

Cytologic Diagnosis; a Survey of Its Problems and Effectiveness as a Diagnostic Procedure. H. R. PRATT-THOMAS. *South. M. J.*, 1954, 47: 709.

AFTER its sudden popularity, in which cytologic diagnosis was considered by some to be a new miracle method of cancer diagnosis, this method is now settling into its rightful position as an important adjunct to cancer diagnosis—a signpost to help guide the plans for further diagnostic and therapeutic measures in the individual patient.

This diagnostic method has placed a great additional responsibility on the pathologist who must interpret the cell changes, and on the individual physician who is charged with obtaining satisfactory specimens and then must utilize the pathologist's report in its proper perspective in deciding on the future management of that patient. The author reports on his experience in cytologic diagnosis in a variety of sites.

From his experience with 9,121 cytologic examinations of the cervix, he concluded that this method has its greatest value in the diagnosis of early carcinoma in the normal, slightly inflamed, or eroded cervix. Obvious lesions should have actual biopsy. A positive cell study may be followed by a negative biopsy, but often repeated biopsies will lead to a positive report.

The method is particularly applicable in diagnosing carcinoma of the lung. Sputum examinations were more practical and more accurate than bronchial washings in this series. Specimens from bronchiectasis were the most difficult to diagnose, the one unequivocal false positive being from such a case. There is a marked squamous metaplasia in these cases which produces atypical cells which might be confusing. With only 30 per cent of lung carcinomas being accessible for biopsy diagnosis, the remainder must be diagnosed by other means, and it is in these that cytologic study becomes so significant. While multiple specimens are indicated before accepting a negative report in an individual suspicious case, too great a number can jeopardize the whole cytologic program. If four good specimens are reported negative, cytologic study in that individual should be discontinued.

For gastric lesions, 57 per cent of carcinomas were correctly reported when the abrasive balloon technique was used in obtaining the specimen. Two drawbacks of this method are the psychologic hazard of swallowing the device, and the difficulty in getting good specimens from antral lesions, apparently because the balloon's descent is blocked by the lesion. Simple aspiration after saline lavage provided 21 per cent correct diagnosis in gastric carcinoma, and with mucolysis produced by papain, only 16 per cent were positive.

One case is described in which a duodenal ampullary carcinoma was diagnosed by studying duodenal aspirations. Such study may be worthwhile in cases of obstructive jaundice. —*Stanley W. Tuell, M.D.*

The Surgical Treatment of Pulmonary Tuberculosis. FREDERICK G. KERGIN and HUGH S. COULTHARD. *Surg. Clin. N. America*, 1954, 34: 931.

VARIOUS modern surgical methods for the treatment of pulmonary tuberculosis are discussed. Drainage of tuberculous cavities is seldom indicated except in special circumstances, and in these cases simple external drainage by a tube is more satisfactory than the more complicated methods such as those described by Monaldi and Eloesser.

Uncomplicated tuberculous pleuritis should be treated by aspirations and antibiotic therapy supplemented when necessary by decortication if the underlying lung is healthy, or by thoracoplasty if it is not. External drainage is used if the tuberculous pleuritis is complicated by secondary infection or by bronchopleural fistula.

Artificial pneumothorax and thoracoplasty are declining in popularity and many patients formerly treated by these methods are now treated by bed rest and antibiotics or by pulmonary resection.

Scalenotomy, intercostal neurectomy, and phrenic paralysis are obsolete methods or have only a very restricted use today.

Pulmonary collapse by extrapleural pneumonolysis and supraperiosteal pneumonolysis are also obsolete methods.

Thoracoplasty, which has been a mainstay of therapy of pulmonary tuberculosis for the past 25 years, has now been replaced by excisional therapy.

Bilateral tuberculosis is treated by antibiotics, temporary collapse measures and limited resection, and less often by thoracoplasty as in the past.

Until the end of 1953, 261 resection operations have been done on 258 patients at the Toronto General Hospital and the Toronto Hospital for Tuberculosis. Fifty-seven of these were pneumonectomies, 107 lobectomies, 12 lobectomies plus segmental resection, 67 segmental resections, and 18 wedge resections.

The use of antituberculous drugs (streptomycin, para-aminosalicylic acid (PAS), and isonicotinic acid hydrazide) for periods up to 18 months has profoundly influenced the course of pulmonary tuberculosis. As yet, insufficient information is available to indicate whether this treatment can, in a high proportion of cases, abolish the tubercle bacilli from the fibrocaseous nodules which frequently remain as a residue in the infected area of lung. For lack of a better criterion the size of the residual nodule or nodules is the chief con-

sideration in making a decision as to whether or not residual lesions should be extirpated.

—*Frederick W. Preston, M.D.*

Surgical Treatment of Pulmonary Tuberculosis. VIKING OLOV BJÖRK. *Acta chir. scand.*, 1954, 107: 371.

IN PULMONARY tuberculosis a plan for radical treatment is chosen as the first procedure when possible. Thus waste of time and loss of function may often be avoided. Bed rest and chemotherapy, however, remain the basic treatment.

The aim of radical treatment is to leave the patient with a negative guinea pig test of the sputum and gastric washings. If this can be obtained by any plan of treatment without making the patient a respiratory cripple, this radical plan is followed. Radical treatment is not defined by the surgical treatment itself, but includes all treatment which leaves the patient permanently free from tubercle bacilli in the sputum and gastric washings. Patients with conditions too far advanced for radical treatment may still benefit from surgery. A thoracoplasty may improve their condition even though the guinea pig test remains positive.

There were 17 fatalities and 19 fistulas formed in the 435 patients subjected to radical procedures.

Resection is advised in patients with: (1) giant cavities, (2) tuberculomas, thick-walled cavities, and calcifications in the cavity wall or surrounding parenchyma, (3) middle and lower lobe cavities, (4) bronchial stenosis, (5) bronchial fistula and empyema, and cavity rupture, (6) residual cavities under thoracoplasty and destroyed lobes or lungs, and (7) positive sputum and bronchiectasis.

—*Stephen A. Zieman, M.D.*

The Effect of Preoperative Streptomycin on the Incidence of Bronchopleural Fistula After Pulmonary Excision for Tuberculosis. WALLY GORDON. *J. Thorac. Surg.*, 1954, 28: 1.

BRONCHOPLEURAL fistula after pulmonary excision for tuberculosis is a common complication. In a series of 140 patients, fistula, empyema, and spread of disease occurred after excision of all or part of the upper lobe without significant difference in the two sides. Removal of the middle or lower lobes was not complicated by either fistula or empyema.

The effect of preoperative streptomycin therapy was studied on the incidence of fistulas after excision of the upper lobes only, and in a control group. The incidence of fistula in patients not receiving streptomycin before operation averaged 50 per cent while in the treated group this complication did not exceed 16 per cent. The British Tuberculosis Association reported histologic evidence of tuberculosis at the point of bronchial transection in 95 per cent of 94 surgical specimens. Tuberculous infection of the bronchial stump can be suppressed by streptomycin therapy, which should be instituted at least 3 weeks prior to operation.

—*B. G. P. Shafiroff, M.D.*

Cryptococcosis of the Lung; Report of 2 Cases with Successful Treatment by Lobectomy. J. KARL POPPE. *J. Thorac. Surg.*, 1954, 27: 608.

CRYPTOCOCCOSIS (torulosis) is a relatively rare fungus disease, and only about 200 cases have been reported in this country. The disease may affect any part of the body but has a special predilection for the brain and meninges. About one-quarter of the cases shows pulmonary involvement either alone or as an initial stage of the disease before extension into the brain.

In early cases of pulmonary cryptococcosis patients are usually relatively asymptomatic, with perhaps only a slight nonproductive cough. The diagnosis in these patients is not suspected, since only a localized area of pneumonitis is found on routine chest films, which area is ordinarily suspected of being neoplastic. It is only on pathologic examination of the resected surgical specimen that the correct diagnosis is made. While still in a curable stage, the fungi are encapsulated and not available for a positive laboratory test preoperatively by studies of either sputum or of bronchoscopic aspiration.

The authors report 2 cases in which persistent x-ray shadows were suggestive of pulmonary malignancy. Repeated sputum examinations were negative for tuberculosis, as were the bronchial aspirates examined for tumor cells. Exploratory thoracotomy was performed in each case. Right upper lobectomy was performed in the first case, right pneumonectomy in the second. Each specimen showed a solid granulomatous lesion containing large numbers of Cryptococcus neoformans. No recurrence of the disease was observed in the first patient after 18 months, nor in the second patient after 6 months.

Medical treatment of cryptococcosis has been very unsatisfactory, although sulfonamides and actidione have produced the most favorable reported results.

—*Earl W. Cauldwell, M.D.*

On Suppurations of the Lung, with Particular Reference to Abscesses of the Lung. O. PERÄSALO and J. RAILO. *Acta chir. scand.*, 1954, 107: 425.

DURING the period from 1942 to 1952, 159 patients with abscess of the lung were treated. The abscess was spontaneous in 132 cases and caused by a foreign body in 27 cases. Male patients comprised the greater part of the series and nearly one-half of the patients were between 31 and 50 years of age.

The series was divided into groups according to the etiologic background. The largest group (44 per cent of all the cases) included the patients in whom the onset of the disease was characterized by symptoms of acute pneumonia. However, it was difficult to conclude whether true pneumonia was present in all of the cases or whether the condition was merely the primary pneumonic stage of acute abscess of the lung. In 17 per cent of the patients the disease was caused by a foreign object lodged in the lung parenchyma. In 26 per cent there had been no ascertainable preceding disease, nor even acute symptoms at the onset in some cases. An antecedent disease which could be correlated to the abscess with respect to time was present in the case history of only 21 per cent of the patients.

On the basis of this series, the genesis of an abscess of the lung is regarded to be chiefly a pneumonic process. Treatment should be conservative in the acute stage and surgical in the chronic stage. The choice of operative procedure is determined not only by the nature and extent of the lesion but also by the pros-

pects of postoperative recovery and by the extent of respiratory tissue loss. Abscesses formed around foreign bodies in the lung have the same tendency to become chronic as other abscesses. The foreign body should be removed immediately when any reason for removal becomes evident.

—*Stephen A. Zieman, M.D.*

The Treatment of Pulmonary Abscess. HOWARD K. GRAY and HERBERT W. SCHMIDT. *Med. Clin. N. America*, 1954, 38: 1027.

THE authors emphasize the tremendous change that has come about in the treatment of pulmonary abscess during the past 20 years. In that period, the figure for the number of pulmonary abscesses which heal spontaneously has changed from 20 per cent to 80 per cent, and this marked increase can be directly related to the introduction of antibiotics in the treatment of these abscesses.

Five factors are listed as prominent ones in the production of pulmonary abscesses.

Infection. Cultures of abscesses usually show the organisms commonly seen in the oral and nasal passageways.

Bronchial obstruction. Foreign body, tumor, or broncholith obstructs evacuation of the bronchial secretions and thereby promotes infection.

Disturbed bronchial physiology. Anesthesia and other unconscious states obtund the cough reflex and predispose to aspiration.

Pulmonary ischemia. If a large enough segment of lung is deprived of its blood supply, necrosis and infection can occur.

Trauma to the lung. During certain crushing injuries, a spicule of rib may enter the lung and thus cause infection.

Aspiration still is the most frequent cause of abscess formation and prophylactic measures against this are still important. Bronchoscopy should be performed whenever the lesion is suspected, not only to localize the abscess but also to rule out any obstructing bronchial lesion.

The current treatment of lung abscess should start with appropriate antibiotic therapy based on the culture of the sputum. Up to 4 weeks of observation are permitted and if there is no improvement in this time surgical management must be undertaken. Here again, in the past 20 years a complete change in management has come about. The early treatment of lung abscess by surgeons consisted of incision and drainage in almost half the cases. At the present time almost 70 per cent of the patients coming to operation are treated by resection (segmental resection, wedge resection, lobectomy, or pneumonectomy). External drainage has not been completely discarded and is still a useful procedure in the extremely toxic patient and in those patients in whom the risk of resection seems too great. —*Harold M. Unger, M.D.*

Possibilities and Limitations in the Cytological Diagnosis of Pulmonary Carcinoma (Possibilita' e limiti di diagnosi citologica del carcinoma polmonare). RENZO GARBAGNI. *Medicina*, Parma, 1954, 4: 51.

THE cytological diagnosis of pulmonary carcinoma is thoroughly reviewed and the methods used are described. The author prefers the Isaac and Wurch modification of the Papanicolaou stain.

An exact diagnosis was made in 72 per cent of the cases with a false positive result in 3 per cent of the cases. The total number of cases is not mentioned. The author considers the cytological study of pulmonary excretions as an important adjunct in the diagnosis of pulmonary cancer, especially in the early stages. The best results were obtained with spontaneous expectoration following cough. Considerable experience is necessary and the normal findings should be well known before cancer is studied.

There are 16 color photographs of stained cells and 6 black and white pictures illustrating typical cases.

—*Lucian J. Fronduti, M.D.*

Clinical Aspects of the Cytological Diagnosis of Pulmonary Carcinoma (La diagnosi citologica nel carcinoma bronchiogenico; punti di vista clinici). J. L. HANSEN, P. MARASCHIO. *Tumori*, Milano, 1954, 40: 126.

THE authors report on their results regarding the cytological diagnosis of pulmonary carcinoma during the years from 1944 to 1951. The number of false positive diagnoses diminished as they acquired more experience. In the benign pulmonary lesions this percentage dropped from 12.8 to 0.6 in 1951 in a total of 1,025 cases.

In 44 per cent of 250 cases of histologically proved carcinoma the cytological study was positive. The percentage of positive results increases with an increase in the number of cytological examinations made, and the necessity of carrying out 5 or more examinations is emphasized.—*Lucian J. Fronduti, M.D.*

On the Histogenesis of Primary Cancer of the Lung. HISASHI TAUCHI and SUMIKO GOTO. *Nagoya M. J.*, 1953, 1: 265.

THE authors had the opportunity of observing 26 autopsy cases during the past few years and extensive pathologic studies were made of these specimens. In the present report, the results of these investigations on the histogenesis of the disease are presented. There were 23 males and 3 females whose ages ranged from 27 to 72 years. The clinical course varied from 3 months to 2 years, 6 months. The primary focus was seen in the right upper lobe in 13 cases, in the right lower lobe in 5, in the left upper lobe in 6, and in the left lower lobe in 1 case; one was unclassified. In most cases the tumor was situated close to the hilum of the lung. In 23 of the 26 cases there was the formation of cancerous tissue and ulcer or stricture of the bronchial lumina in the comparatively large bronchi (as in the lumen of the secondary or tertiary bronchi), and in 2 of these cases there was cancerous destruction of the bronchus.

The histologic findings of the primary and metastatic foci were extremely varied, and it was possible to recognize adenocarcinoma, squamous cell epithelioma, carcinoma simplex, small round-celled cancer, and other forms. In the adenocarcinoma group, the authors were able to distinguish two types: the typical adenocarcinoma which is composed of cylindrical epithelial cells that lie closely packed side-to-side and in close relation to the basement layer of the mucous

membrane, and an atypical adenocarcinoma showing the cancer cells to be irregular in shape—round, polygonal, spindle-shaped, cylindrical, triangular, or fan shaped—the cells lying loosely packed but closely connected again to the basement membrane. In more than one case the authors also found a different type of cell pattern in the tumor parts of the body of the same individual. —*Matthew H. Evoy, M.D.*

Sarcoma of the Lung. THEODORE H. NOEHREN and FRANK W. MCKEE. *Dis. Chest*, 1954, 25: 663.

PRIMARY sarcoma of the lung is a rare entity, with an incidence of 0.014 per cent of autopsies. Prior to 1903 it was considered the most common primary pulmonary malignancy. Today the diagnosis of many of the early sarcomas is questioned, while at the same time the clinical symptoms in these same cases are retained as the diagnostic criteria for this tumor.

In a review of the literature since 1912, the authors found 34 cases, to which they have added 1 case of their own. All of these cases included adequate histories, follow-up, postmortem examinations and microscopic descriptions of the tumor, to allow critical evaluation. The authors present a detailed description of their own case.

The age and sex figures for the 35 cases reveal a steady incidence of sarcoma of the lung from the age of 10 through 70 years of age, and the incidence in males is slightly higher than in females, a ratio of 19 to 16.

The incidence of the various symptoms is about the same as for carcinoma of the lung: cough, 74 per cent; weight loss, 49 per cent; hemoptysis, 43 per cent; pain, 43 per cent; fever, 43 per cent. Many of the patients had more than one symptom at the time of admission.

Laboratory studies were of no significance in the differential diagnosis of sarcoma of the lung.

Of the total number of 35 cases, 17 (48.5%) were amenable to surgical treatment. In 4 of the patients the tumor could be removed without sacrificing lung tissue. One patient coughed up the tumor, with no evidence of recurrence in 4 years. Follow-up studies of the patients treated by surgical intervention indicate that 59 per cent of the patients are alive and free of recurrence. The follow-up interval in many of the cases is short, ranging from a period of 6 months to 4 years.

The types of sarcoma were as follows: spindle cell, 15; fibrosarcoma, 6; lymphosarcoma, 5; osteoid chondrosarcoma, 1; mixed cell sarcoma, 1; reticulum cell sarcoma, 1; "round cell" sarcoma, 1; myosarcoma, 1; sarcoma, 1.

There were 10 cases in which metastases were found at postmortem examination and 8 cases in which no metastases were found. The location of the metastases was as follows: the lungs in 8; local nodes in 2; kidney in 2; spleen in 2; liver in 2 cases; and the brain, diaphragm, heart, and spine, each in 1 case.

The authors conclude that in patients with sarcoma of the lung, the duration of life appears to be longer following removal than in patients with carcinoma of the lung, and that the resectability rate is 48 per cent as compared with 24 per cent in a large group of carcinomas of the lung presented by the group at Presbyterian Hospital in New York.

—*John H. Davis, M.D.*

Intracavitary Radioactive Colloidal Gold in the Treatment of Malignant Pleural Effusion. MALCOLM Y. COLBY, JR. *Med. Clin. N. America*, 1954, 38: 1133.

PRIOR to the coming of artificial radioactive isotopes, treatment of malignant pleural effusion consisted merely of repeated thoracentesis and x-ray therapy, which in themselves tended to deplete a patient suffering from a general debility commonly associated with advanced malignant neoplastic disease.

Pleural effusion commonly results when there is involvement of the pleural surfaces by a malignant neoplasm, most frequently metastatic spread. X-ray treatment of the entire pleural space requires the irradiation of the entire hemithorax at a dosage level of such magnitude that the disturbances of treatment, nausea, anorexia, vomiting, and leukopenia, usually overcome the beneficial effects which might be expected from stopping the formation of fluid.

It is the author's opinion that artificial radioactive isotopes offer a new approach to this problem, and in the few years since Mueller first reported their clinical use in malignant effusions, it has become increasingly apparent that the intracavitary instillation of radioactive colloidal gold is a useful technique in the treatment of malignant effusions in the pleural and peritoneal spaces.

The preparation and physical properties of radioactive colloidal gold, its distribution, deposition and fate, mode of action, method of administration, dosage, and hazards are discussed, and presented in detail.

Numerous authors have reported their results of treatment of malignant pleural effusion with radioactive colloidal gold. In general, these results indicate that between 35 and 50 per cent of the patients treated are benefited. If one excludes the patients who died very soon (within 1 month) after treatment, then the proportion of patients benefited rises to 60 or 70 per cent.

In an 18 month period beginning in March, 1952, the author administered radiogold intrapleurally to 41 patients who were suffering from pleural effusion associated with malignant neoplastic disease. The primary malignant lesions were carcinoma of the breast in 19 cases, bronchogenic carcinoma in 9, ovarian carcinoma in 6, hypernephroma in 2, carcinoma of the stomach, of the corpus uteri, and of the pancreas in 1 case each, and a melanoepithelioma. Other than differences which one could attribute to variations in the natural course of the various malignant processes, there was no apparent correlation between the type of primary tumor and the benefit achieved.

A preliminary survey indicates that about 40 per cent of the patients treated received definite benefit as shown by a significant reduction in the amount and rate of accumulation of pleural fluid or complete cessation thereof. Intrapleural instillation of radioactive gold is a new method of treating pleural effusion resulting from malignant processes that involve the pleural space. The rationale and technique of the method are described. This new method appears to

be a valuable adjunct to the care of this most distressing condition. —*John H. Mohardt, M.D.*

Penicillin-Resistant Staphylococcal Infections Following Thoracic Surgery Treated with Large Doses of Penicillin. KNUD RIEWERTS ERIKSEN and FREDERIK THERKELSEN. *Acta chir. scand.*, 1954, 107: 456.

STAPHYLOCOCCAL infections arising in a hospital are often resistant to ordinary antibiotic therapy possibly because of the extensive use of various antibiotics during recent years. Postoperative infections are still considered a problem in thoracic surgery. Such infections in most cases are due to the Staphylococcus aureus which is present in great numbers in hospitals.

The treatment of infections due to sensitive microorganisms may result in their replacement by resistant staphylococci. The rationale for treating infections due to resistant staphylococci with penicillin is based on the fact that the penicillin resistance of staphylococci is exclusively or predominately due to the production of penicillinase. When large amounts of penicillinase have formed it seems reasonable to suspect that an effect with penicillin may be obtained if it is given in doses so high that the penicillinase is unable to destroy the entire amount of penicillin.

The authors describe 12 cases of infections following thoracic surgery due chiefly to penicillin-resistant staphylococci, which were treated with doses of from 2 to 5 million units of sodium penicillin given twice daily. Nine of the patients had empyema following lung resection and 3 had empyema from a different cause. Additional organisms present were the Bacillus coli, Bacillus pyocyaneus, and Bacillus haemophilus. In the present series of cases the favorable course of the complications was striking. The cavities became sterile and the fistulas closed. The mortality was relatively low. In a few instances penicillin was supplemented by additional antibiotics, but usually only for a short time. This combined treatment did not seem to be particularly valuable in staphylococcal infections. However, in mixed infections with gram negative rods the combined therapy was thought preferable.

In the authors' opinion the present series, although small, indicates the favorable effect of large doses of penicillin on resistant staphylococci.

—*Allan D. Callow, M.D.*

The Effect of Cavernostomy on Giant Pulmonary Cavities. Report of 28 Cases. C. STEPHANOPOULOS and T. TSIMONOS. *J. Thorac. Surg.*, 1954, 27: 546.

THE authors report 28 cases of giant tuberculous pulmonary cavities which were treated by cavernostomy. For various reasons, these patients could not be treated by other means. Catheterization of the cavity was performed by the method of Monaldi. The sinus was enlarged by inserting and removing catheters of increasing diameters. Finally the cavity was packed with gauze soaked in antibiotics, and, if necessary, open draining bronchi were cauterized. All patients had previously been tried on PAS and streptomycin, and all had been subjected to unsuccessful attempts at pneumothorax. Neither thoracoplasty nor lobectomy was possible, because of poor condition of the patient or because of contralateral involvement. Complete therapeutic results were indicated by obliteration of the cavity and permanent obstruction of the draining bronchi. With marked cavity shrinkage but no bronchial obstruction the patient was classed as improved and, if possible, further treatment by thoracoplasty was then indicated. Where no change was observed after 6 months of treatment, the patient's condition was classed as "without effect," and conditions made worse were classed as "aggravated."

There is a better chance for favorable results in men than in women. Longstanding disease predisposing the lung tissue to sclerosis renders closure of the cavity more difficult. Age did not seem to make any difference; however, there would be a tendency to decreased elasticity of the lung tissue and a decreased tendency to cavity closure. In slowly progressive disease, success was attained in 58 per cent of cases, while in the more progressive form, success was attained in only 18 per cent. The incidence of cure is highest in cavities of the middle and lower parts of the lung; in the upper portion there is less healthy lung tissue surrounding the lesions and more adhesions are present. The size of the cavities does not tend to influence the treatment. Where the tissue surrounding the cavity is essentially healthy, the incidence of cure is 53 per cent, whereas with tuberculous or sclerotic surrounding tissue, the cure rate decreases to 15 per cent.

Thirty-six per cent of the patients had complete cure, 36 per cent showed definite improvement (3 of the latter had subsequent thoracoplasty or lobectomy), and 28 per cent showed no improvement, or suffered aggravation of the lesions as a result of the procedure.

—*Victor M. Bernhard, M.D.*

Present Concepts in the Treatment of Empyema in Children. J. H. HERTZLER, A. E. MILLER, and WILLIAM M. TUTTLE. *Arch. Surg.*, 1954, 68: 838.

FROM January, 1949 to July, 1953, 41 children were hospitalized with a primary or secondary diagnosis of thoracic empyema, at an average of approximately 9 admissions yearly. Previous studies revealed an average of 40.7 admissions annually for the period from 1926 to 1936, and an average of 28 admissions annually from 1936 to 1940. The primary objectives in the treatment of thoracic empyema are (1) sterilization of the infected areas, and (2) early obliteration of the pleural spaces. Only medical therapy (specific antibiotics and aspiration therapy) were required for satisfactory resolution in 18, or 43 per cent, of the present series of cases. Surgical intervention was necessitated in 23, or 57 per cent, 15 requiring intercostal tube drainage and 9 pulmonary decortication.

There seems to be but little question that the earlier specific measures to obliterate the pleural space are instituted, the less often are more radical surgical procedures required. This obliteration must be done by aspiration, drainage, or decortication. Often the clinical improvement resulting from decreased toxicity following the use of specific antibiotic therapy is presumed to indicate that satisfactory resolution is under way, but delay only permits time for organization to continue and the complications of empyema, bronchopleural fistula, fibrothorax with scoliosis, and entrapped lung to occur. If the initial attempts at aspi-

ration do not adequately evacuate the space and there is no primary indication for decortication, tubal drainage should be carried out immediately.

Primary indications for decortication are the trapped or encased lung which is held secure in the "peel" of organized exudate over the lung surface. Evidence of this is failure of the lung to expand despite adequate drainage, repeated aspirations, or empyema impossible to aspirate. Loculation of exudate characterized by irregular collections of fluid and air within the chest require decortication. Persistent bronchopleural fistulas are best closed by decortication, which permits the lung and fistula site to adhere to the chest wall and further insure closure.

Although the pneumococcus causes the great majority of pneumonias, there is a relative as well as an absolute increase in staphylococcal infections of the lung and pleura since the introduction of chemotherapy. In this series, the sterilizing effect of antibiotic therapy given sporadically and indiscriminately prior to admission to the hospital is reflected in the larger numbers of sterile effusions and loculations requiring surgical intervention.

Although 551 children were treated for empyema between the years 1926 and 1941, only 6, or 1.1 per cent had conditions which were considered as complicated and had become chronic in type. During the period from 1949 to 1953, 14 patients with empyema were encountered, of whom 9, or 21.9 per cent, required decortication to heal their condition. The early use of pulmonary decortication in patients with captive lung or inaspiratable empyema is to be highly recommended. —*David H. Lynn, M.D.*

HEART AND PERICARDIUM

The Assessment of Patients for Cardiac Surgery. R. M. MARQUIS and A. RAE GILCHRIST. *Edinburgh M. J.*, 1954, 61: 31.

THE FOLLOWING CRITERIA are recommended for the proper selection of patients for cardiac surgery. Precise anatomic diagnosis must include evaluation of physical signs, x-ray examination for ventricular enlargement or pulmonary vascularity, and electrocardiograms for abnormal physiologic patterns. Catheterization and angiocardiography may be done to provide supplemental data in the clinical evaluation. The operative risk must be determined on the basis of the patient's disability and the surgical risk must justify the patient's welfare. The mortality from thoracotomy alone rises with advancing age. Surgical procedures should not be undertaken as a last resort measure because of a minimal cardiac reserve or because of congestive failure, past or present. Facilities must exist for the proper preoperative and postoperative care of surgical cardiacs. Organized medical teams should be available to treat every operative complication such as auricular fibrillation, embolic attacks, pulmonary collapse, and congestive failure. A physiotherapist should faithfully enforce all types of respiratory exercises during the preoperative and postoperative phases of treatment.

At the Royal Infirmary, a total of 165 consecutive cases of patent ductus were admitted. Of this number, 129 were submitted to surgery. The operative mortality rate was originally 7.5 per cent, but with the elimination of bad risk septicemic cases, the mortality rate has fallen to 1.8 per cent. The most serious complication of patent ductus was found to be infective endarteritis of the pulmonary artery, a condition similar to subacute bacterial endocarditis. In the former the vegetations are confined to the pulmonary artery and the embolization is limited to the pulmonary circulation. This septicemic state was best controlled by closure of the ductus and antibiotic therapy.

Coarctation of the aorta was diagnosed in a series of 53 patients ranging in age from 18 days to 57 years. Only 6 patients in this series were submitted to surgery. Recently surgical intervention has been extended to patients in the 15 to 25 year age group.

Of a group of 500 patients with mitral stenosis, 159 were subjected to valvulotomy. Surgical intervention was denied for advanced myocardial disease, cardiac cirrhosis of the liver, or embolic hemiplegia. Factors favoring operation were clinical signs of tight mitral stenosis, recent deterioration in exercise tolerance, recurrent hemoptysis, and right ventricular hypertrophy. Surgery should be recommended before structural changes have advanced. Cardiac enlargement, gross left atrial enlargement, recurrent embolic episodes, and calcification of mitral valve were considered factors against operation before disability became marked. Satisfactory valvulotomy was possible in only 50 per cent of the cases. Patients with left atrial enlargement do better on medical treatment. Severe disability during pregnancy was found to be an unreliable indication for valvulotomy. Even when the mitral lesion is predominant, surgical intervention is not indicated in patients with advanced aortic disease. The overall operative mortality of mitral valvulotomy was 3 per cent and the cause of death in each case was embolic. About 50 per cent of the patients showed significant benefits resulting from the operation. Based on the hypothesis of Morgagni and the author's clinical and pathologic observations, mitral stenosis will tend to recur even after successful valvulotomy. —*B. G. P. Shafiroff, M.D.*

Atrioseptal Defects; a New Surgical Approach and Diagnostic Aspects. VIKING OLOV BJÖRK, CL. CRAFOORD, BENGT JONSSON, SVEN ROLAND KJELLBERG, and ULF RUDHE. *Acta chir. scand.*, 1954, 107: 499.

IN SPITE of the fact that the history, physical examination, electrocardiography, and roentgen examinations are often sufficient for the diagnosis of atrioseptal defects, heart catheterization is necessary to verify the diagnosis, to calculate the amount of shunted blood, and to measure the pressure in the pulmonary artery. Localization of the septal defect and its size must be ascertained and other heart malformations must be excluded or diagnosed. Pitfalls in the diagnosis include atrioseptal defects which lie close to the valvular plane, in which cases there is negligible mixing of the blood in the right atrium, and ventricular septal defects which may be wrongly assumed from the blood gas analysis.

Venous angiocardiography often does not allow a distinction between an atrioseptal defect and a patent

foramen ovale and it is consequently necessary to visualize the anatomic features of the septal defect. This may be accomplished with a high concentration of contrast medium in the left atrium. The authors describe a technique based on the principles of selective angiocardiography in which the whole amount of contrast medium (1.2 mm. per kilogram of body weight of a 70 per cent solution of urokon) is injected into the left atrium in a retrograde direction in less than 1 second and more than ten pictures per second are taken in each plane. An additional refinement is the use of an inflatable balloon fixed to a catheter and expanded by contrast medium for outlining the defect.

The authors believe that the method of Sondergaard and Husfeldt was effective only in small defects high in the septum and not in cases with a very large defect or one situated close to the valvular plane. Sondergaard and Husfeldt's method was modified by the authors by introducing a finger through the right auricular appendage to palpate the septal defect for its size and localization, to exclude an abnormal pulmonary venous return, to exclude or dilate a mitral stenosis, and to guide a long thin rounded needle around the defect. The finger should remain in the right auricle to control the result obtained when the suture is tied.

The right chest is entered through the bed of the sixth rib; procaine is injected into the pericardial sac, the pericardium is opened, and both the superior and inferior vena cavae are dissected free at the entrance to the right auricle. In this manner a groove is dissected between the two atria and the dissection is continued until the crossing of the muscle bundle from one auricle to the other is seen. The finger is introduced through the right auricular appendage to palpate the defect in the two atria. Guided by this finger a needle is introduced behind the defect. If a septal rim remains, the needle is guided within this rim.

The needle is introduced at the root of the aorta, 1–2 cm. behind the origin of the right coronary artery. It is introduced subendocardially until the valvular plane is reached, at which point it is rotated over to the right to avoid the coronary sinus; it is then brought out behind the inferior vena cava. If there is no septal rim in the valvular plane the needle is directed through the upper border of the interventricular septum. By rotation of the needle when the valvular plane is reached it will pass obliquely from the right side of the interventricular septum over to the left side and diminish the danger of damaging the bundle of His. The needle is brought out through the left auricular wall as close to the atrioventricular border as possible. The heavy silk thread (No. 4 or 5) that has been passed with the needle around the atrioseptal defect is then tied over a piece of fascia or muscle from the chest wall to prevent cutting through the dissected groove into the vena cavae or the right pulmonary vein. The silk thread is drawn taut until the palpating finger finds the defect completely closed. The authors have operated on 12 patients, 10 of whom survived and tolerated the operation well. They caution that the suture should be passed subendocardially in the septal rim. If the suture is lying free in the atrium, thrombosis may result and cause pulmonary emboli. Care should be exercised so that no residual defect remains in the septum close to the valvular plane for even a small opening will probably cause a considerable shunt.

—*Allan D. Callow, M.D.*

Closure of Atrioseptal Defects; Report of 3 Cases. TYGE SONDERGAARD. *Acta chir. scand.*, 1954, 107: 492.

AFTER A brief historical review of methods utilized by various workers for the closure of atrioseptal defects, the author describes a procedure worked out in the University of Copenhagen for this purpose. The technique is based on the fact that the atrial septum in its peripheral part consists of the separated walls of the two atria with fat and loose connective tissue between them. A cleavage plane is easy to develop down to the point where the muscular fibers of the right and left atrial walls join to form the true septum. After the chest is entered through the bed of the sixth rib and 1 per cent procaine is injected around the vagus and phrenic nerves and the sympathetic chain, the inferior and superior caval veins are dissected free close to the heart. A piece of heavy silk is guided around each of the veins for traction in order to facilitate dissection of the cleavage plane between the right and left atria. This cleavage plane is developed from above behind the superior caval vein down in front of the pulmonary veins and is continued behind the inferior caval vein. The right auricle is elevated and the cleavage carried down to a point just behind the aorta. This is usually to a depth of 1 to 2 cm. An oiled suture of heavy silk is anchored in the upper edge of the interventricular septum behind the aorta where the atrial septum joins the ventricular septum anteriorly. The suture is tied and one end is cut short. The long end is guided behind the superior caval vein.

A similar suture is placed in the ventricular myocardium below and a little to the left of the inferior caval vein. The long end of this suture is guided behind the inferior caval vein and up in the cleavage between the right and left atria. The bottom of the cleavage plane is covered with a strip of gelfoam and the two sutures are tied together under moderate tension. In this manner the bottom of the cleavage plane is pulled down to the upper edge of the ventricular septum, which functionally closes the defect in the atrial septum.

The author believes that this method of closure of atrioseptal defects with a suture in the septal plane placed in the natural cleavage area between the two atria is a much more physiologic method than any of the invagination procedures which have previously been described. A new septum is created in its normal place without interference with the blood flow through the great veins or through the right atrium. There is no ensuing deformation of the heart and both the right and left atria preserve normal function. The procedure is not difficult and less risky to the patient than any other method which employs an open suture of the defect. The author gives three case reports.

CASE 1. A boy 5 years old who at the age of 14 months had been diagnosed as suffering from congenital heart disease was found to have a large left to right shunt through an atrioseptal defect with no evidence of other shunts. At operation by invagination

of the atrial wall the defect was palpated and found to be more than 30 mm. in diameter. By the technique described the defect was reduced to a slit barely allowing the tip of the palpating finger. The patient died suffering from whooping cough and bronchopneumonia approximately 8 months later. At postmortem examination the atrioseptal defect was still present but reduced in size to less than a third of the preoperative diameter. The suture in the cleavage plane between the right and left atria was found to have been ideally placed, but with too little tension to close the defect completely.

Case 2. A girl of 5 years with cyanosis since birth had been admitted on many occasions because of failure to gain weight, acute upper respiratory infections, extreme dyspnea, and cyanosis, and during the preceding year had been almost completely incapacitated. The cardiothoracic index was found to be 12.5/18. Oxygen saturation determinations revealed a large left to right shunt through the left atrium. At operation invagination of the atrial wall revealed no septum at all that could be felt. At the end of the operation the defect admitted the tip of the finger. The patient became more dyspneic and more cyanotic immediately after the operation and died 36 hours later. Autopsy examination revealed the atrioseptal defect reduced to an oval slit just admitting a finger. The sutures had been placed as desired and when cut the newly formed septum unfolded. There was no trace of an interatrial septum. Both the tricuspid and the mitral valves were fibrosed and markedly insufficient.

Case 3. A girl 12 years of age complained of fatigue and dyspnea with slight cyanosis since early childhood. The cardiothoracic index was 13.5/21.5. A large left to right shunt through an atrioseptal defect was revealed by oxygen saturation determinations. At operation the atrial septum was found to be completely absent. The defect was reduced to an oval slit just above the ventricular septum, admitting the tip of two fingers. Further tension on the sutures would have compromised the flow through veins entering the heart from the right lung and in the caval veins. The patient tolerated the procedure well and was discharged improved 4 weeks after operation.

—*Allan D. Callow, M.D.*

Atrial Septal Defect; Clinical and Physiologic Response to Complete Closure in 5 Patients. S. Gilbert Blount, Jr., Henry Swan, Goffredo Gensini, and Malcolm C. McCord. *Circulation,* 1954, 9: 801.

The mean duration of life in patients with atrial septal defect is to the middle or late thirties. Some patients with large atrial septal defects die early in life due to failure secondary to right ventricular overwork, while others develop pulmonary hypertension and then cardiac decompensation. Among a group of 25 cases of isolated atrial septal defects, 5 were chosen for surgical correction. This was accomplished without mortality, with the use of an anterior bilateral thoracotomy and with the patient in a hypothermic state so that the procedure could be done under direct vision after cardiac inflow occlusion.

The patients were carefully studied by cardiac catheterization. Of the total group of 25 patients, 13 had normal pulmonary artery pressures and 12 had pulmonary hypertension. The duration of pulmonary blood flow, as determined by age, did not appear to have any relationship to the development of hypertension. In the normotensive group, pulmonary artery O_2 saturation was 85.5 per cent and the mean pulmonary index was 13.2 liters. In the hypertensive patients, the O_2 saturation was quite variable, averaging 70.9 per cent. The pulmonary index was also quite variable, between 1.4 and 18.7 liters. The patient with lowest oxygen saturation and the lowest index also had the most severe degree of hypertension. Pulmonary arterial resistance was low in the nonhypertensive group and markedly elevated in patients with hypertension.

The case histories of each of the 5 surgically treated patients are presented in detail.

In selecting patients for surgical correction of the defect, it would be of value to be able to differentiate the patients who will survive for a long time with the lesion uncorrected from those who will develop pulmonary hypertension with serious debility and death; however, it would seem impossible to make such selection. It was noted that the normotensives had pulmonary artery blood flow of greater magnitude than the hypertensives. From this it would appear that neither the duration nor the magnitude of the blood flow are of critical significance. The increased pressure, the decreased flow, and increased resistance in the pulmonary artery in the hypertensive group "suggests a loss of the normal distensibility of the pulmonary vascular bed and the development of occlusive changes in the smaller pulmonary arteries and arterioles." At present, surgery is advised for patients with a pulmonary blood flow three times that of the systemic flow. The presence of pulmonary hypertension does not rule out surgical success, as indicated in the cases of 2 patients who had hypertension; however, in patients with marked-to-moderate hypertension and a high diastolic pressure associated with normal or only slightly elevated flow, surgery is not advised.

Hemodynamic changes after surgery include the absence of any evidence of left-right shunt which would indicate complete closure of the defect. Pulmonary artery pressure dropped to within normal limits in the 2 patients with hypertension, and a significant drop in pulmonic pressure was noted also in 2 normotensive patients. One patient revealed evidence of functional pulmonic stenosis reflecting a greatly elevated pulmonic artery flow. This disappeared completely after surgery, and the authors warn against confusion with true stenosis. Total pulmonary arterial resistance remained moderately elevated in 3 of the patients, which suggested residual changes in the small arteries and arterioles. Systemic blood flow was normal preoperatively and postoperatively. Pulmonary blood flow was elevated in all cases, to some degree, preoperatively, and fell significantly to levels equaling the systemic flow postoperatively.

Clinically there was amelioration of the symptoms of dyspnea and fatigue. The mechanism for these symptoms in the first place is believed to be on the basis of decreased resiliency and elasticity of the lungs due to vascular engorgement. The pulmonic systolic murmur, present in all patients, was absent in 2 and

decreased in the other 3 patients postoperatively. This murmur is thought to be associated with a functional pulmonic stenosis due to increased pulmonary artery blood flow. The short mid-diastolic murmur of medium pitch heard in 3 of the patients preoperatively, completely disappeared after the operation. This is considered on the basis of a relative tricuspid stenosis due to increased blood flow, and not on the basis of a mitral stenosis (which was ruled out by palpation at surgery). The authors state that this murmur does not necessarily indicate the presence of a Lutembacher's syndrome; it is located over the left sternal border. Reduplication of the second heart sound in the left second intercostal space was not altered postoperatively. Incomplete right bundle branch block persisted. Intensity of the second heart sound decreased in the patients with pulmonary hypertension. The heart size decreased in all patients. The pulmonary artery remained enlarged though pulsation decreased to normal. —*Victor M. Bernhard, M.D.*

Mitral Stenosis With and Without Surgery. W. G. Bigelow and W. F. Greenwood. *Surg. Clin. N. America*, 1954, 34: 875.

Surgery is indicated for mitral stenosis at any stage of the disease, provided that a narrowed mitral valve is the main cause of the disability and that the patient can survive the operation. Certain patients with mitral stenosis can be operated upon with little risk and with remarkable improvement. The characteristics of this ideal patient are (1) clinical proof of mitral stenosis, (2) a definite disability due to pulmonary congestion, (3) absence of other important diseases such as mitral regurgitation, aortic valvular disease, or active myocarditis, and (4) absence of right heart failure.

The first 88 of the authors' 150 cases in which operation was done for mitral stenosis are analyzed. The ages of the patients varied from 17 to 53 years.

Twenty of the group were in right heart failure for a short period of time prior to operation and 8 had been in chronic failure for at least 6 months prior to admission to the hospital. There were more deaths and fewer good results from the operation among these patients than in the ideal patient. The chief reason for lack of satisfactory improvement was the presence of a higher incidence of serious regurgitation in this group. Occasionally in these patients a satisfactory result could be obtained if the valve was anatomically suitable.

Thirteen of the 88 patients had had systemic emboli preoperatively. They all had auricular fibrillation. In 7, a clot was found in the auricle. Three had emboli in the immediate postoperative period. There was one fatality in this group. In general, these patients had the disease in an advanced stage and did not do as well as the average.

Seven of the 88 were pregnant and were operated upon between the third and fifth months of pregnancy. All 7 went to term and had normal babies. In general, the earlier during pregnancy the operation is done, the better.

Thirty-six of the 88 patients were fibrillating at the time of operation. Although this is usually a sign of advanced disease, it does not influence the decision to operate or affect the results appreciably, although it does increase the difficulty and risk of the operation. If other factors are favorable, moderate cardiac enlargement does not exclude a patient as a candidate for surgery.

Preparation of the patient and the operative technique are discussed. One important point is avoidance of surgery until the patient has recovered from acute rheumatism and acute pulmonary edema if these states exist.

Hypothermia to reduce the oxygen requirement of the patient during anesthesia has lowered the operative mortality in poor risk cardiac patients.

The natural life history of unoperated upon patients with mitral stenosis has been studied in 171 case histories for comparison with the life history of those operated upon. The patients operated upon have a much improved prognosis both as to survival and comfort in living. —*Frederick W. Preston, M.D.*

The Results of Mitral Valvotomy for Mitral Stenosis. John H. Gibbon, Jr., Frank F. Allbritten, Jr., John Y. Templeton, III, Robert K. Finley, Jr., and Others. *Ann. Surg.*, 1954, 139: 786.

Several groups of patients who have had valvotomy for mitral stenosis have now been evaluated over a sufficient postoperative interval to provide significant data regarding the effectiveness of the operation.

Of 95 consecutive patients operated upon from July 28, 1949 to December 1, 1953, 70 were females and 25 were males. The ages of the patients ranged from 12 to 55 years.

The technique employed, whether finger fracture or the knife method, was done through an anterolateral incision. There were 11 deaths, an operative mortality of 11.5 per cent. Four of the deaths were due to technical errors.

Eleven of the 95 patients were thought to have mitral stenosis, but at operation were found to have regurgitation with no significant degree of stenosis.

Sixty-one patients with mitral stenosis were operated upon 6 months ago, or more, and are classified according to their capacity for effort before and after operation. In this group there were 6 operative deaths and 1 late death. Forty-three patients had an excellent result, 8 had a good result, 2 were unchanged, and 1 was worse following operation.

—*Stephen A. Zieman, M.D.*

Mitral Commissurotomy Through the Right Thoracic Approach; Technique and Indications. Wilford B. Neptune and Charles P. Bailey. *J. Thorac. Surg.*, 1954, 28: 15.

Patients with mitral stenosis and associated lesions, such as tricuspid stenosis, interatrial septal defects, and pulmonary disease involving the right lung, can be operated upon through the right hemithorax. Thoracotomy through the fourth intercostal space is performed either by the posterolateral or anterior approach. The pericardium is incised anterior to the phrenic nerve. The superior vena cava is mobilized by dissection in the sulcus terminalis and the left atrium is exposed. Parallel rows of stay sutures and an encircling purse-string suture are placed in the exposed atrium. Through a stab wound, mitral commissurotomy is then performed. The atrial wall is closed by

tying the stay sutures and by an everting mattress suture. Associated tricuspid stenosis can then be performed through the right auricular appendage. Pulmonary disease of the right chest, such as bronchiectatic lesions or tumors, may be excised at the time of commissurotomy. Cardiac anomalies such as interatrial septal defects coexistent with mitral valve disease can be explored easily through the approach from the right side. Brief case histories in which this approach was used are given. —*B. G. P. Shafiroff, M.D.*

Surgical Treatment of Tricuspid Stenosis. THOMAS J. E. O'NEILL, O. HENRY JANTON, and ROBERT P. GLOVER. *Circulation*, 1954, 9: 881.

TRICUSPID STENOSIS rarely exists as a solitary lesion; its highest incidence occurs in association with mitral and aortic disease, or (next most commonly) with mitral disease alone. A clear-cut clinical diagnosis can not usually be made because of the masking effect of the mitral lesion. The diagnosis can be made during life either by noting residuals after mitral commissurotomy, or by deducing from rather unimpressive findings that something in addition to mitral disease exists. The findings include the absence of symptoms of pulmonary hypertension in a patient with auscultatory evidence of mitral stenosis and edema. These patients are not orthopneic or dyspneic. The presence of abnormally vigorous venous pulsations, cyanosis, right atrial enlargement, diminished pulmonary arterial dimensions, localized diastolic murmur at the lower end of the sternum, and a typical catheterization pressure tracing with a large A wave, occurring at the time of atrial systole, may contribute to the diagnosis of tricuspid stenosis.

The authors present the case of a 36 year old woman who was first treated for mitral stenosis by commissurotomy and who later developed evidence of tricuspid stenosis. Her symptoms included recurrence of dyspnea on exertion, decrease in exercise tolerance, and the development of edema of the face and breasts. Venous pulsations of the neck veins were noted, diastolic rumble was heard between the mitral area and the xiphoid, and the previous loud snap of the mitral first sound was absent.

Catheterization indicated an elevation of the atrial pressure over that of previous catheterizations, indicating stenosis of the tricuspid valve. Tricuspid commissurotomy with a guillotine knife was performed, and the patient was markedly improved when examined after 2.5 months. —*Victor M. Bernhard, M.D.*

Results of Pulmonary Valvotomy and Infundibular Resection in 100 Cases of Fallot's Tetralogy. MAURICE CAMPBELL, D. C. DEUCHAR, and RUSSELL BROCK. *Brit. M. J.*, 1954, 2: 4880.

OF THE 100 patients with Fallot's tetralogy operated on by Brock's direct methods, 45 were subjected to infundibular resection only; all the others had pulmonary valvotomy, but 18 needed infundibular resection as well. Both of these direct operations can produce excellent results. Two-thirds of the patients have presented good or very good results, leading a quiet life that is nearly normal. One-sixth showed some benefit but nothing like the good results. The remaining sixth died as a result of the operation.

In most particulars there was not much difference between the results of the two operations for Fallot's tetralogy, but valvotomy, with a gross mortality of 11 per cent, seems reasonably safe, and infundibular resection, with (as might be expected) a higher mortality of 18 per cent, seems more dangerous. Another difference is that infundibular resection rarely fails to produce a good result in those who survive, while after valvotomy, alone or combined, there are a larger proportion who show only slight or moderate improvement.

The improvement, however, in what these patients can do is as great as after anastomotic operations. Moreover, there is the same reduction in their cyanosis and in the polycythemia and hemoglobin percentages. The improvement in color and in the clubbing of the fingers may be even greater than after anastomotic operations, and some patients lose all their cyanosis at rest and a few even after exertion. In these, catheterization shows that the oxygen saturation of the arterial blood has become normal and that their right-to-left shunt has not only been diminished but reversed.

The heart tends to become larger after direct, as after anastomotic, operations. The striking improvement as the result of increasing, directly or indirectly, the blood flow to the lungs has overemphasized the stenosis and drawn attention away from the ventricular septal defect and the overriding aorta. The improvement in the cyanosis, however, showed that the venous shunt to the aorta is much less. But so long as the ventricular septal defect remains, the right ventricle will have increased work and will be exposed to the risk of strain. Despite the great advantages that anastomotic and direct operation can give, it is believed that the treatment of Fallot's tetralogy will not be ideal until the ventricular septal defect can be closed. —*Stephen A. Zieman, M.D.*

Traumatic Rupture of the Thoracic Aorta; Review of the Literature and Case Report. JACK B. JAY and S. W. FRENCH, III. *Arch. Surg.*, 1954, 68: 657.

AFTER a brief review of the literature the authors present a case of traumatic rupture of the thoracic aorta. Traumatic rupture of the thoracic aorta is rare, but even more unusual are reports of long survival with this lesion. Because of the long survival in their particular case, and the possibility that some of these unfortunate patients may be saved, this case was presented.

The most common cause of rupture of the thoracic aorta is rapid deceleration of the body such as occurs in automobile collisions or aircraft accidents. In the aorta, the connection between the relatively mobile descending portion and the fixed arch is the area of the isthmus or just below the left subclavian artery. In cases of rapid deceleration the patient is momentarily subjected to very large forces which may be resolved along three principal axes: horizontal, vertical, and lateral. Horizontal forces result in the tearing of the aorta at its fixed portion and vertical forces result in the bursting of its weaker portions; i.e., at the isthmus and just above the aortic valves.

The author's patient was a 20 year old white male who had been involved in a head-on automobile

collision on June 30, 1952. He sustained a fracture of the jaw and of the right femur, plus severe concussion of the anterior chest wall. During the first 2 or 3 months of hospitalization he complained of anterior pleuritic chest pains and aching between the scapulae. Six months after injury and 1 month after discharge from the hospital the patient was readmitted in shock with a massive left hemothorax. Fluoroscopy revealed a pulsating mass in the region of the aortic arch. A left thoracotomy was performed; 2,000 c.c. of blood were evacuated, and a 4 cm. aneurysm of the aortic arch was discovered. Because of the possibility of rupturing this friable aneurysm the operation was terminated. It was decided to wait for collateral circulation to develop before attempting a graft.

Postoperatively the pulsating mass continued to enlarge, and the patient was then transferred to Walter Reed Army Hospital for a possible arterial homograft.

On March 11, 1953 the patient was again operated upon. At this time operation revealed an 8 by 10 cm. solid pulsatile mass extending from the innominate artery to 7 cm. above the diaphragm and extending upward into the root of the neck. The lesion was deemed inoperable and the chest was closed. The patient did well until April 21, 1953 when he died suddenly in bed.

Postmortem examination revealed a 2 cm. defect on the lateral aspect of the aorta, 4 cm. below the left subclavian artery. This led to a 6 by 8 cm. false aneurysmal sac. Death was due to erosion and rupture into a medium-sized bronchus. The authors believed that survival for 10 months apparently was based on the formation of a false aneurysmal sac during enforced bed rest for treatment of femoral fracture. In retrospect, they also believed that perhaps this lesion should have been resected and repaired as soon as it was discovered.

—Harold L. Method, M.D.

Aneurysm of the Aorta; a Review of 365 Cases. Arthur H. Blakemore and Arthur B. Voorhees, Jr. *Angiology*, 1954, 5: 209.

During the past 20 years, 365 patients with aneurysm of the aorta were treated at the Presbyterian Hospital, in New York. It is apparent that arteriosclerosis is assuming the major etiologic role in this condition, and that syphilis will continue to decline as a causative factor.

The evolution of the electrothermic coagulation of aneurysms by wiring is discussed in detail, together with the precision technique which fosters concentrically laminar clotting, based on the all important differential rate of blood flow concept. Modifications of this technique, for use in conjunction with partially occlusive banding of the aorta distal to the renal arteries, are presented.

A critical evaluation of the various techniques is given. When postoperative mortality, survival, symptom relief, and relapse rates are under consideration, it is apparent that the therapy of an aneurysm may be approached in one of several ways, to the advantage of the patient, and that care in selection of the technique is as important as is the performance.

Studies in the use of bridging prostheses constructed from Vinyon "N" cloth and its early application are summarized. *—Samuel Kahn, M.D.*

Resection of Aneurysms of the Aorta. Charles Dubost and Claude Dubost. *Angiology*, 1954, 5: 260.

Six cases of aneurysm of the aorta are discussed in detail. In 1 patient, follow-up observations were carried out for as long as 3 years.

The first 3 patients had an aneurysm of the abdominal aorta below the renal arteries. The iliac arteries were involved in all of the cases. Treatment consisted of resection of the aortic aneurysm and replacement with a graft. The grafts had been removed some days previously and stored after the method of Gross. Preoperative aortography demonstrated the presence of an aneurysm in all 3 cases. The first patient has been followed for 3 years and is living and well. He has bilaterally equal and strong femoral, posterior tibial, and dorsalis pedis pulses. The histology of the surgical specimen is described in each case.

The fourth patient was a 27 year old man with coarctation of the aorta. A direct aortic anastomosis was performed with a good result.

The fifth patient had an intrapericardial aneurysm of the ascending aorta. The mass was dissected off the surrounding structures, lateral clamps were applied, and the aneurysm was resected. Suture of the aorta was through diseased tissue and the patient died 6 months later following a sudden hemorrhage. An autopsy was not performed, but it was believed that rupture of the diseased portion of the aorta had occurred.

The sixth patient had an arteriovenous renorenal fistula which followed nephrectomy. The nephrectomy had been performed 17 years previously. The fistula was across the aorta and inferior vena cava and it was difficult to determine whether it was aortocaval or renorenal. The origin was determined by freeing the aorta above and clamping it for short periods of time. The sac was resected and the patient made an uneventful recovery. The authors state this is the seventh reported case in the literature.

Finally, the authors briefly review the problems involved in aneurysms of the ascending aorta, aortic arch, descending aorta, and subrenal aorta. It is believed that resection at the level of the renal arteries is not possible because of the many collaterals as well as the main renal arteries. *—John H. Davis, M.D.*

ESOPHAGUS AND MEDIASTINUM

Benign Esophagus Strictures Caused by Reflux Esophagitis in Cases of Duodenal Ulcer. Paul Rudström. *Acta chir. scand.*, 1954, 107: 404.

Reflux esophagitis is defined as the nonspecific changes within the esophagus which are caused by regurgitation of gastric secretion in connection with disturbances of the cardia function. The regurgitated gastric secretion causes, when it comes into contact with the esophageal mucosa, a more or less widespread and deep change leading to stenosis and structure formation. Reflux esophagitis is, however, often found with diaphragmatic hernia. The latter condition should be excluded first in all investigations.

Six cases of esophagitis with strictures are described. Thoracotomy and exploratory operation of the cardial area were performed. In 2 cases cardial resection was performed. In 2 cases vagotomy was carried out in order to reduce the production of gastric secretion. In 1 case the esophagus was only explored, and in the last case gastroenteroanastomosis was performed.

A partial resection is probably more effective in reducing the hyperacidity than is vagotomy, and it also has the advantage of causing the stomach to empty more quickly. —*Stephen A. Zieman, M.D.*

Ciliated Epithelial Cyst of the Esophagus Associated with Cardiac Abnormalities; Report of 2 Cases. Oscar Creech, Jr., and Michael E. De Bakey. *J. Thorac. Surg.*, 1954, 28: 64.

Ciliated epithelial cysts of the mediastinum are believed to be derived from the bud of the primitive trachea (bronchogenic cyst) or from the wall of the developmental esophagus (ciliated epithelial esophageal cyst).

Two case reports of circumscribed tumors which proved to be epithelial esophageal cysts are discussed. In both cases cardiac abnormalities were noted and it is conceivable that pressure from these cysts may have been associated with side effects on the heart. Mobilization of these cysts necessitated incision of the esophageal musculature but communication with the lumen did not exist. The lining epithelium of both cysts consisted of flat cuboidal cells and pseudostratified ciliated epithelial cells.

Both esophageal and bronchogenic cysts arise from the primitive pharynx. At the time of tracheal and esophageal separation during the 4–5 mm. stage, tissue sequestration occurs. With the descent of the heart, elongation of the esophagus results in cystic development in the cardioesophageal region. Gastrogenic cysts found in the mediastinum attached to the esophagus are not related to esophageal cysts but represent congenital duplications from the gastrointestinal tract with a functional lining epithelium

—*B. G. P. Shafiroff, M.D.*

Results of Surgical Treatment of Carcinoma of the Esophagus and Gastric Cardia; a Follow-Up Study. Lester R. Chauncey. *Arch. Surg.*, 1954, 68: 872.

The author analyzes 54 cases of carcinoma of the esophagus or gastric cardia. Only 13 of the patients were under 60 years of age. The presenting symptoms uniformly encountered were dysphagia, retrosternal or epigastric distress, weight loss, or hemorrhage. The onset of dysphagia as a definite entity is believed to be of such importance as to warrant exploration on the basis of this symptom alone when barium studies and endoscopy prove to be negative. Endoscopic examination is no longer considered mandatory since it proved to be less accurate than roentgenoscopy and is attended with the hazard of perforation.

The average duration of the symptoms was approximately the same in the group deemed resectable as in the group in which the process had extended beyond the prospect of cure.

All operative procedures were performed through a left thoracic approach complemented by a transverse abdominal extension in instances of carcinoma of the cardia. In 6 of 23 patients resected for carcinoma of the cardia total gastrectomy was done. On occasion, other organs have also been resected. Additional operative procedures were subsequently performed in 3 patients.

Of the entire group of 54 patients, 7 were inoperable, 12 proved to be unresectable, and 35 were resected (resectability rate of 65 per cent). There were 8 operative mortalities, 5 following resection of the cardia, 1 after resection of the lower esophagus, and 2 after removal of lesions at the level of or above the arch of the aorta.

Thus, only 27 patients, or one-half of the entire group, were successfully resected and available for follow-up study. Eight are still alive, 4 being long-term survivors. The over-all mean palliation achieved has been 15.7 months, but, if one excludes the long-term survivors, the mean palliation achieved in the group who have already died is only 10 months.

Lesions in the proximal third of the esophagus were encountered in 18 patients, 5 of whom were deemed inoperable, and all expired within 3 months. Resection was completed in only 7 of the remainder (46 per cent), of which 2 failed to survive operation and 2 died soon thereafter. Carcinoma of the lower esophagus was encountered in 8 patients, all of whom were explored and 5 were resected. One failed to survive operation and the others died within a period of 18 months. Viewing the cases of carcinoma of the esophagus as a group, irrespective of site, the average short-termed palliation achieved was 13.4 months. Only 1 patient may be considered a long-term survivor (66 months).

Of 28 patients with carcinoma of the cardia, 2 were inoperable and both died within 1 month. Three were unresectable and all of these died within 2 months. Resection was performed in 23 (82 per cent), death occurring at operation in 5 (21 per cent). The mean palliation achieved in the 18 surviving patients lasted 14.6 months. There were 3 so-called long-term survivors, which if excluded would reduce the survival rate to less than 9 months.

Lymph node metastases were demonstrable in 23 of the 35 patients resected, an incidence of 65 per cent. Of 12 patients successfully resected for carcinoma of the cardia in whom metastases were encountered, 3 are living and well at periods of 53, 33, and 12 months —the average survival time being 6.6 months for the entire group. Of 6 patients with carcinoma of the cardia with no demonstrable metastases, 4 died within 1 month and 2 are living and apparently well at 41 and 14 months, respectively. Somewhat similar findings were encountered in carcinoma of the esophagus. In 6 patients, glandular involvement was demonstrated; in 6 it was not. Of the former group, all died within a comparatively short period. By contrast, in the group free of implants 3 of 4 successfully resected are still alive and well at periods of 56, 19, and 5 months.

Although the outlook for long-term survival of patients with carcinoma of the cardia or esophagus is dismal, the degree of palliation usually achieved is very satisfactory. Although his period of life may be short, the patient is able to eat, swallow, and live

comfortably. In estimating the effectiveness of this type of therapy, consideration should be given to the ineffectiveness of other types of currently available therapy. The hope of attaining better end results through earlier diagnosis appears to be futile since widespread metastases are often encountered in patients with minimal symptoms of short duration.

—*David H. Lynn, M.D.*

Late Results of Surgical Treatment of Carcinoma of the Esophagus. RICHARD H. SWEET. *J. Am. M. Ass.*, 1954, 154: 422.

AN OPERATIVE approach to carcinoma of the esophagus is considered by some physicians only in favorable and possibly curable cases. The author believes that the benefits of surgical treatment should be extended to the largest possible number of patients except those who are inoperable. Because of the topographic and anatomic relations peculiar to the esophagus, the selection of patients who will profit from an operation will depend in large part on the location of the growth. Data obtained in 450 cases observed over 14 years indicate that in carcinoma of the cervical and superior mediastinal areas, operation should be done only when the tumor is small and presumably free from lymph node metastases.

In carcinoma of the midthoracic area and lower esophagus, however, the palliation of symptoms provided by esophagectomy and the possibility of longer survival are such as to encourage more widespread use of this procedure. Among 90 patients with carcinoma of the midthoracic segment who survived operation, the 5 year survival was 4 per cent; among 147 patients who survived resection with anastomosis for carcinoma of the cardia, the 5 year survival was 17 per cent. However, when these cases were reclassified on the basis of resections judged originally to be palliative and those considered curative, the survival figures for the two groups were 14 and 34 per cent, respectively. In carcinoma of the cardia, survival data were identical whether the growth was epidermoid carcinoma or adenocarcinoma.

Of the remaining patients in these two groups, who either died within 5 years from distant metastases or were still alive following operation less than 5 years previously, the great majority were relieved of distressing dysphagia—*Orville F. Grimes, M.D.*

MISCELLANEOUS

Thymic Cysts. A Review of the Literature and Report of 2 Cases. WILLIAM G. KRECH, CLIFFORD F. STOREY, and WILLIAM C. UMIKER. *J. Thorac. Surg.*, 1954, 27: 477.

THE AUTHORS review the literature on an exceedingly rare lesion, the thymic cyst. Up to the time that they reported their 2 cases, only 8 cases in which these cysts were resected had been reported. The lesion was usually discovered at autopsy, and most of the early authors attributed it to syphilis. It is probable that cysts of the thymus of an infectious origin are probably of syphilitic origin. A more reasonable explanation in non-neoplastic cysts is that the cyst represents a congenital defect in the embryonal descent of the thymus in its passage from its cervical origin at the level of the third branchial cleft and pouch. Degeneration and necrosis in a neoplasm explains the cysts seen within a tumor.

Two cases with successful resection are presented and an addendum concerns 2 further cases. There are preoperative roentgenograms and good photomicrographs of the lesion in the original article.

—*Harold M. Unger, M.D.*

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Hernias in the Poor Risk Patient; Their Surgical Management. KENNETH W. WARREN. *Surg. Clin. N. America*, 1954, 34: 761.

HERNIAS in the aged and poor risk patient come to surgical management either as acute emergencies or when evaluated for elective operation. Because of recent advances in anesthesia and in maintaining fluid and electrolyte balance, it can be said that any patient who is ambulatory can be carried safely through a herniorrhaphy. In emergency situations, even poorer risk patients may be safely operated upon.

When incarceration or strangulation is present, one must evaluate the patient for intestinal obstruction and if it is present immediate decompression with the Miller-Abbott tube should be attempted. Evaluation of the fluid and electrolyte balance and attempts at correction must be made. Persistence in either of these forms of treatment must not be too strenuous because often the relief of the incarceration or the strangulation will be the only means of curing both of these ills. Digitalization of patients in cardiac failure must be instituted. If urinary retention exists, an indwelling catheter should be inserted.

In the patient in whom an elective herniorrhaphy is considered, optimal preparation should be emphasized. Cardiac failure should be relieved by digitalization. Electrolyte balance should be restored if necessary. Preliminary transurethral resection for prostatism should be performed when indicated. Concerted effort should be made to clear any pulmonary infection, and in the event of the presence of an allergic bronchitis, an attempt should be made to desensitize the patient to his allergen.

Spinal anesthesia offers the best muscle relaxation but it may be contraindicated in certain cases. A drip of anectine may be preferable. Local anesthesia in many patients is the anesthesia of choice.

In discussing factors in technique, the author stresses the importance of opening the peritoneal sac in all hernias, direct and indirect, in order to eliminate the hernia completely and to rule out an associated indirect or femoral hernia in the case of a direct hernia. In the last, the sac is always opened nearest the internal ring to avoid bladder injury. Silk, cotton, or other nonabsorbable suture material is used. Restoration of the defect of the transversalis fascia is emphasized. Reinforcement of this repair is essential and may be the only part of the repair possible when the transversalis fascia is markedly attenuated. In these cases the musculofascial bundle along the lateral rectus sheath is sutured either to the shelving edge of Poupart's ligament or to Cooper's ligament. It is stressed that with careful attention to the anatomy this type of repair will be adequate and that resort to grafts will rarely be necessary.

Femoral hernias are repaired through an oblique infrainguinal incision when uncomplicated. A lower vertical rectus incision may be added when release of an incarcerated or strangulated hernia is difficult or when resection is necessary.

If obesity is corrected, ventral hernias may usually be repaired without the use of tantalum mesh or grafts, but both of these methods may be needed in advanced cases. —*Harold M. Unger, M.D.*

GASTROINTESTINAL TRACT

The Management of Spastic and Hypertrophic Pyloric Stenosis (Zur Behandlung der spastischen und hypertrophischen Pylorusstenose der Säuglinge). R. BAUER and W. MANDL. *Wien. med. Wschr.*, 1954, 104: 510.

THE difficulties and dangers involved in the conservative treatment of infants with pyloric stenosis are emphasized. Although the symptomatology and diagnosis of pyloric stenosis have long been recognized and the value of early surgical treatment established, medical management and delay of surgical treatment still contribute to an excessive mortality for this condition. From a practical standpoint the differential diagnosis between spastic and hypertrophic pyloric stenosis is exceedingly difficult and causes confusion with respect to surgical indications.

If conservative management is to be carried out, it should only be done with an awareness of its limitations and difficulties and should be abandoned in favor of surgical treatment before irreversible dystrophy and complications ensue. Early operation for spastic vomiting, with an occasional unnecessary operation, is far less hazardous than delayed treatment. If medical management is elected and results are not achieved within 5 days, surgical intervention is mandatory. Rammstedt pyloromyotomy under local anesthesia is the treatment of choice. The salient features of preoperative and postoperative care are outlined. —*John L. Lindquist, M.D.*

The Pathology of Gastric Arteries, with Special Reference to Fatal Hemorrhage from Peptic Ulcer. G. R. OSBORN. *Brit. J. Surg.*, 1954, 41: 585.

THE AUTHOR examined the gastric and coronary vessels in 50 consecutive patients who died from coronary thrombosis. In 45 of the 50 cases the gastric arteries appeared totally normal; in 3, small inflammatory arterial lesions were found; only 2 showed a lesion which could be called arteriosclerosis. No relationship between peptic ulcer and arteriosclerosis of the gastric arteries could be demonstrated.

Twenty-six fatal cases of hematemesis were then studied. Over two-thirds of the patients were free from hypertension at the time the massive hemorrhage developed. It is possible that the gastric arteries are protected from stress by their numerous anastomoses.

Arterial lesions are common in the region of peptic ulcers, in the form of erosions, which may be chronic, subacute, or acute The latter is the typical lesion of fatal hemorrhage from peptic ulcer.

Studies in cases of carcinoma of the stomach revealed chronic erosion to be commonly present.

Of the 26 fatal cases of massive hemorrhage from peptic ulcer, 6 were uremic. One of the most striking features of the history is the absence of pain, suggesting the possibility of a relationship between pain and chronic arterial erosion.

If chronic erosion is well developed in the arteries of the ulcer, the case is suitable for medical treatment because the patient cannot bleed to death; if acute arterial erosion is present the patient will almost certainly die unless a partial gastrectomy is performed in the pre-uremic state; an intermediate group with subacute arterial erosion may recover under medical treatment, or may die within a week or two of uremia or recurrent hemorrhage.

The type of erosion present and the course of the hemorrhage are determined by unknown factors. Rapid rate of blood loss suggests acute arterial erosion. Duodenal ulcers which cannot be removed should be exteriorized to prevent recurrent hemorrhage.

—*S. Lloyd Teitelman, M.D.*

The Problem of Massive Gastrointestinal Hemorrhage from an Undetermined Source. HOWARD K. GRAY, WILBOURN C. SHANDS, and CAROL THURINGER. *Ann. Surg.*, 1954, 139: 731.

THE SOURCE of the bleeding in certain patients who have experienced massive gastrointestinal hemorrhage remains obscure even after many methods of investigation have been used. When it is impossible to determine the source of hemorrhage prior to operation and when no definite lesion can be found at the time of operation, the magnitude of the problem is compounded and the surgeon is confronted with the necessity of making a decision, even though he has only conflicting evidence to guide his thinking. The purpose of this study was to find, if possible, evidence to support a recommendation for definitive action when confronted with this set of circumstances and to eliminate the quandary which all surgeons have experienced occasionally.

The results of follow-up studies are reported on 48 patients who have been operated on at the Mayo Clinic in the 10 year period from 1937 through 1946 for massive gastrointestinal hemorrhage, and in whom the surgeon was unable to determine the source of the hemorrhage at the time of operation. Twenty-eight of these patients underwent exploration, but no definitive operation on the gastrointestinal tract was performed, and 63 per cent of these experienced recurrence of massive hemorrhage within 5 years. The other 20 patients underwent partial gastrectomy after sources of hemorrhage in the bowel had been as carefully excluded as possible, and only 11 per cent of these experienced recurrence of massive hemorrhage within 5 years. Factors relating to the number of preoperative hemorrhagic episodes and the age of the patients indicated that younger persons who have experienced one or more massive gastrointestinal hemorrhages prior to operation are more likely than older persons to bleed subsequent to operation unless a partial gastrectomy is performed.

When the removed portion of stomach, and in some instances a small rim of duodenum, was examined in the laboratory of surgical pathology, a definite lesion from which the hemorrhage may have originated was demonstrated in 8 of the 20 specimens. These lesions consisted of a small, active gastric ulcer in 4 of the specimens, a duodenal ulcer in 1, chronic gastritis with areas of mucosal ulceration and hemorrhagic areas, noted by the pathologist, in 2, and a healed gastric ulcer in 1. In the remaining 12 specimens varying degrees of chronic gastritis were noted, but in none of these was it possible to incriminate a specific area as the possible site of hemorrhage.

Although this series of cases is admittedly small and therefore subject to statistical misinterpretations, it would appear reasonable to conclude that when the surgeon is unable to determine the source of massive gastrointestinal hemorrhage at the time of operation, he is justified in performing a partial gastrectomy, but only after meticulous search of the stomach, duodenum, small bowel, and large bowel has been unrewarding.

Acute Massive Hemorrhage in Peptic Ulcer. SAMUEL F. MARSHALL. *Surg. Clin. N. America*, 1954, 34: 701.

BLEEDING peptic ulcer is still a problem and the method of treatment is by no means settled. The trend recently, however, has been toward more radical surgical measures, and earlier surgical interference will often save the patient's life. The mortality from massive hemorrhage, according to reports in the literature, varies from 1.3 per cent to 28.7 per cent.

It is important to determine the source of bleeding in the absence of a history of chronic peptic ulcer, and examination of the upper gastrointestinal tract after massive bleeding has occurred is now an accepted procedure. The only contraindications to roentgenologic examination are shock and previous substantiation of the bleeding source.

A small group of patients with bleeding ulcers must come to surgery and operation alone can save these people. This is true especially of patients who have recurrent bouts of bleeding. A majority of the cases, however, can be managed conservatively with the use of large amounts of blood. When operation is undertaken, partial gastrectomy is the operation of choice. The author does not believe that vagotomy alone is of any value in the treatment of acute massive hemorrhage.

—*Ely Elliott Lazarus, M.D.*

Danger of Peptic Ulceration; a Survery of 8 Cases Complicating Surgery and Trauma. P. A. LANE ROBERTS. *Brit. M. J.*, 1954, 1: 1295.

PEPTIC ulceration after trauma may be regarded as the abnormal reaction of an ulcer-prone patient to a physiologic stimulus. Until such time as the physiologic reaction to stress and trauma can be measured and safely regulated, the best way to deal with this complication is by prophylaxis and by early recognition and treatment. Prophylaxis is difficult, as the ulcer-prone patient does not declare himself. It is not the practice of surgeons to ask patients awaiting consultation to fill in questionnaires on personal habits and previous and family history; were it so, however, it would be worth asking, "Have you suffered much from indigestion?" or "Do you take stomach powders, tablets, or mixtures?" If the patient be over the age of

50 and a man, particular heed should be paid to such an admission. A careful general history is as important in surgery as it is in medicine.

If such a history is elicited the regimen after operation should not be too active, and inquiry should be made into upper abdominal symptoms. In addition to the daily examination of the calves, a hand might well be applied to the epigastrium. If relevant symptoms appear, antacids and atropine should be given, and if tarry stools are passed the matter should be reported immediately, a serious view taken, and arrangements made at once to collect serum for cross-matching in preparation for a transfusion of blood that may be needed with great urgency.

Eight cases are presented of ulceration arising as a complication of operation or injury.

This ulceration may arise *de novo* or may be an exacerbation of previous ulceration. A watchful outlook should be maintained for epigastric postprandial pain, particularly in the early convalescent phase. Melena and coffee-ground vomit must be recognized as alarm signals, and immediate steps should be taken to arrange for rapid blood transfusion if necessary.

Energetic medical treatment may well avert death from a complication which has a high mortality rate.

—*Benjamin Goldman, M.D.*

Gastrectomy for Peptic Ulcer. JAMES E. THOMPSON and CHARLES F. STEWART. *Ann. Surg.*, 1954, 139: 721.

THE AUTHORS' REPORT is based on material observed at the Roosevelt Hospital in New York. They stress the aggressive attitude toward peptic ulcer that has been evident at their hospital during the past 15 years, and present 194 cases of carcinoma of the stomach, of which 14.1 per cent were preoperatively diagnosed as benign, on the basis of roentgenologic interpretation. They encountered 2 cases of primary carcinoma of the first portion of the duodenum during this period of time. On the basis of their studies they were inclined to believe that of the two diagnostic media, the roentgenogram and the gastroscope, the former was more reliable than the latter in establishing the true diagnosis. Cytologic examinations of gastric washings and, more recently, scrapings obtained by the use of a gastric brush have been relied upon mainly as confirmatory evidence where suspected lesions exist.

Whenever an ulceration was found in the stomach (provided the roentgenographic report showed that it was suspicious of malignancy) a brief but strict trial was carried out on a medical regimen. If the lesion did not show marked regression or disappearance within 4 weeks, gastrectomy was recommended. The presence of achlorhydria, suspicious or malignant looking cells found in gastric washings, or a palpable epigastric mass were factors militating against further delay in recommending radical treatment.

In a study of 128 cases of gastrectomy for gastric ulcer, 8 patients succumbed to the operation. The cause of death in 2 cases was leakage from the duodenal stump and in both of these cases the closed duodenum had not been drained; 2 deaths resulted from mesenteric thrombosis; 1 patient died of pneumonia, 1 of shock, and 1 of malnutrition. The complications were atelectasis in 8 instances, pneumonia in 7, duodenal stump leakage in 3, coronary occlusion in 2, small bowel obstruction in 2, evisceration in 2, and pulmonary embolus in 2 instances.

Of 399 patients who underwent gastric resections for duodenal ulcer, death occurred in 19. In 2 of these death was due to pneumonia, in 7 to leakage of the duodenal stump, in 1 to gastric hemorrhage, in 2 to peritonitis, in 2 to acute hemorrhagic pancreatitis, in 1 to intra-abdominal hemorrhage, in 1 to wound disruption, in 1 to cardiac arrest, in 1 to incompatible blood transfusion, and in 1 to a biliary fistula.

The 2 patients with fulminating acute pancreatitis had deep ulcers on the posterior aspect of the first portion of the duodenum. In one of these the ulcer was allowed to remain; in the other patient the major portion of the ulcer was carved away from the head of the pancreas, but still a considerable amount of pancreatic tissue was bared by this maneuver.

The one postoperative death, from gastric hemorrhage, occurred in a patient who had been operated upon but failed to rally from the operation. There were 8 other patients with postoperative gastric hemorrhage who were treated conservatively, and all survived.

Ninety-one patients with massive upper intestinal hemorrhage were operated upon as emergencies. Of these, 7 succumbed to the operation: 2 died in uremia, 2 died of coronary occlusion, 1 of recurrent gastric hemorrhage, 1 of obstruction of the small bowel, and 1 of wound disruption. Massive gastric hemorrhage in this series was regarded as a nonsurgical problem until certain criteria developed which are rather standard in surgical thinking.

The authors list the following contraindications to emergency surgery in massive gastric hemorrhage: (1) bleeding of doubtful origin; (2) bleeding from esophageal varices; (3) prompt cessation of hemorrhage under conservative management; (4) blood urea nitrogen readings of above 50 mgm. per cent on admission; and (5) the presence of other serious disease which in itself would contraindicate surgery.

—*Matthew H. Evoy, M.D.*

The Early Gastric Response to Irradiation; a Serial Biopsy Study. MOSHE B. GOLDGRABER, CYRUS E. RUBIN, WALTER L. PALMER, RICHARD L. DOBSON, and BARBARA W. MASSEY. *Gastroenterology*, 1954, 27: 1.

THE AUTHORS present a detailed study of 3 patients with chronic peptic duodenal ulcers which were treated by x-ray therapy over the area of the stomach. This type of treatment has been used by various investigators for many years, dating back apparently to the original report by Bruegel in 1917. Many series of such cases have been reported, and the therapeutic success was proportional to the reduction in the free hydrochloric acid achieved. This study was done at the University of Chicago Clinics, where such treatment has been under observation now for 18 years.

The object of the authors was to make a thorough biopsy sampling of the stomach throughout the period beginning just before the radiation therapy and until the stomach biopsies became histologically normal. Three patients who were very co-operative were selected. The biopsies were obtained by a suction biopsy tube which was inserted into the stomach and by means of which multiple samplings were taken of the

gastric mucosa from various portions of the stomach. Most of the difficulty encountered was that of getting antral mucosal biopsies, as the antrum constitutes less than one-tenth of the total mucosal area. Forty biopsies were taken in each patient over a 4-month period of observation. The histologic change observed varied in severity among the 3 patients studied, although the total pattern followed essentially the same course. It was observed that biopsies taken from various portions of the stomach at the same time showed a patchy type of irradiation response, in that some areas would be more advanced than others, either toward a maximum irradiation effect, or toward a return to normal.

The earliest change observed was coagulation necrosis of the depth of the fundal glands involving both chief and parietal cells. As this process progressed upwards, the pits deepened and neck cells proliferated. The necrotic tubules sloughed and were replaced in part by neck cells and partly by round cell infiltration. At the peak of the x-ray reaction there was partial-to-complete loss of glandular substance with mucosal thinning, edematous interstitial tissue with predominantly chronic inflammatory infiltration, and marked changes in the superficial epithelium. Reversion to normal was prompt, and in all cases histologically complete. The authors state that certain aspects of the radiation reaction were similar to the gastric changes observed after many other types of trauma. Although this study demonstrates that the gastric mucosa can return to normal without scarring after extensive radiation therapy, it has been shown experimentally that the degree of gastric regeneration and scarring is dependent on the depth of the injury.

All 3 patients were studied by gastric analysis before, during, and after the radiation therapy. The fasting specimens in all 3 patients showed a high degree of free hydrochloric acid before the test was begun. In all 3 of these patients the free acid either disappeared completely at the height of the radiation, or was markedly reduced and remained that way at the termination of the experiment. There was also a decrease in the total night gastric secretion occurring concomitantly with the radiation and remaining decreased when the stomach had returned to normal histologically. —*Frederick C. Hoebel, M.D.*

Cancer of the Stomach: 20 Year Cures; Report of 2 Cases. GEORGE T. PACK. *Surgery*, 1954, 35: 920.

THE AUTHOR reports anecdotal and formal accounts of 2 cases of treated carcinoma of the stomach.

The first case is that of a 58-year old male who complained of regurgitation, eructation of gas, upper abdominal distress and epigastric pain, with occasional episodes of vomiting, and a weight loss of 48 pounds over a period of 16 months. No tumor could be palpated. X-ray examination of the upper gastrointestinal tract revealed obstruction of the pylorus with an irregular filling defect and marked gastric retention. Laparotomy was performed and a tumor was found confined to the distal third of the stomach, although the serosa was involved. A retrocolic posterior gastrojejunostomy was performed. Subsequently, a total dose of 1,260 roentgens was given to the anterior port, and 840 roentgens to the posterior field. Nine weeks later the segment of stomach distal to the previous and superiorly placed gastrojejunostomy was removed, together with a segment of the duodenum. The pathologic report was "tubular adenocarcinoma of the stomach." The patient has had no subsequent gastric complaints, and remained in good health at the age of 80 years, 22 years after the second operation.

The second case is that of a 41-year old male who entered the hospital for a complete physical examination. Fluoroscopy and gastric x-ray studies revealed a small circular filling defect on the anterior wall of the pars media. Gastric analysis with histamine revealed complete anacidity. Laparotomy was performed and a polypoid gastric tumor was resected. The pathologic report (James Ewing) was "adenocarcinoma, Grade II." The patient was living and free of evidence of gastric cancer 20 years later.

The author apparently believes that the moral involved is self-evident. —*Earl W. Cauldwell, M.D.*

Primary Lymphosarcomas and Reticulosarcomas of the Stomach, with Special Reference to Primary Lymphosarcoma of the Stomach Treated by Subtotal Gastrectomy, Followed by Roentgen Therapy; Survival for 3½ years Without Signs of Recurrence (Linfosarcomas e reticulosarcomas primitivos do estomago. A propósito dum caso pessoal de linfosarcoma gástrico primitivo, operado de gastrectomia subtotal, seguida de roentgenterápia; sobrevivência de 3 anos e meio, sem sinais de recidiva). FAUSTO CANSADO. *Rev. port. med. mil.*, 1953, 1: 209.

THIS REPORT concerns a 56 year old male with a long history of stomach trouble. Twenty-two years before the time that he was first seen by the author, the patient had been treated for dilated stomach; 7 years later he was suffering from gastric pains which, although they were not typical of gastric ulcer, at least did not rule out such a condition. Again, after about 7 years of relative well-being, the patient began to lose strength and he became anemic—an anemia which was discovered to be due to loss of blood in the feces. At this time the roentgenologist made the diagnosis of duodenal ulcer. After 3 months of rigorous ulcer treatment, roentgenographic films showed the condition to be much improved.

Again, after a 6 year period of relative freedom from serious symptoms, the patient began to fail and blood was discovered in the stool. Absolute rest and observance of an ulcer diet brought relative relief of the symptoms; however, 1 year later the patient suffered attacks of hematemesis and gastric pain and at this time he came under the author's care. In the preceding year, roentgenograms had evidenced a slight irregularity of the border of the greater curvature, and with the present examination the irregularity was found to have become more pronounced and to have spread farther along the greater curvature, particularly in the proximal direction. There was considerable gastric retention, and there was pain on palpation over the stomach. The bulbus was not entirely normal in appearance and, under the diagnosis of duodenal ulcer, gastric dilatation, and gastroduodenitis, operation was decided upon.

At operation the wall of the stomach in the region of the above described roentgenologic findings was

discovered to be infiltrated, thickened, and harder than usual. Some tiny lymph glands were palpable along the greater curvature. A Polya subtotal gastrectomy was done, and later rather heavy doses of roentgen radiation were administered (a total of about 6,500 roentgens).

Approximately 3½ years have elapsed since the operation and the patient has suffered no further evidence of the original trouble; he remains in excellent physical condition and is able to work as usual.

From this report it is evident that lymphosarcoma, which was the anatomopathological diagnosis in the present instance, is a condition which may evolve for a long time without characteristic symptoms, without the appearance of metastases, and with excellent physical condition of the patient. It is also probable that the method of treatment described may bring about improvement and thus render invalid the claims that lack of improvement under treatment (other than surgical and roentgenologic) is characteristic of these sarcomas of the stomach.

Finally, the history suggests that resection followed by roentgen treatment may permit of long survivals (a suggestion which in late years has repeatedly appeared in the medical literature) even after the regional lymph glands seem to have become involved in metastases. In the author's patient, histologic examination of one of the enlarged regional lymph nodes proved such involvement to be a fact.

—*John W. Brennan, M.D.*

Amebic Granuloma; Report of 4 Cases and Review of the Literature. CHARLES G. SPICKNALL and E. CONVERSE PEIRCE. *N. England J. M.*, 1954, 250: 1055.

THE AUTHORS have seen 4 cases of amebic granuloma at the United States Public Health Service Hospital in Baltimore among 214 patients with amebic colitis. These cases are reported as well as a review of the literature.

The first clinical case of amebic granuloma was reported in 1916 by Ricaldoni and Berta. Their case involved the cecum and was treated by resection. One of the important problems related to this lesion was the difficulty of distinguishing it from carcinoma. However, the presence of amebic infection by no means rules out the neoplasm. Since these two conditions may coexist it is thought that when a lesion of the colon is inaccessible to biopsy except by laparotomy, and an amebic granuloma is suspected, a therapeutic trial with antiamebic drugs is indicated before operation is performed.

The great majority of amebomas disappear completely within a month from the beginning of treatment. Furthermore, surgical intervention is dangerous in the presence of amebiasis and is indicated only for complications. Prompt recognition of the disease at the time of operation and proper therapy often prevent death. A comprehensive differential diagnosis includes all conditions in which a mass and diarrhea may coexist. The more important are appendical abscess, diverticulitis, regional enteritis, tuberculous enteritis, actinomycosis, and benign tumor.

Surgical intervention is limited to the emergency care of complications, including intussusception, perforation, obstruction, and abscess formation. Vigorous medical therapy should be instituted as promptly as possible, and the operation should be very conservative. Resection should be done only as a last resort. Amebic involvement of the skin, fulminating exacerbations of the colitis, dangerous hemorrhage, and peritonitis are likely to follow surgical intervention. The greatest difficulty arises in distinguishing appendicitis or appendical abscess from amebic granuloma. Appendectomy in the presence of amebic granuloma of the cecum is a very dangerous procedure. Among the 197 cases summarized in this report there were 27 deaths, 21 of which followed surgery.

The administration of emetine has been the treatment of choice in most of the reported cases. Until more is known about the action of the broad-spectrum antibiotics in the treatment of complications of amebiasis, it is advisable to use emetine or chloroquine together with the antibiotics. Probably the combination of diodoquine and chloroquine followed by carbarsone is as effective as any other therapy and is much less expensive than the antibiotics.

Amebic granulomas occur most commonly in the cecum. The rectum, transverse colon, and sigmoid are involved next, in that order of frequency, the rest of the colon being involved only rarely. However, more than one localization may be present.

There is nothing specific about the symptoms and physical findings when the colon is involved. The typical patient with a cecal lesion has a bloody diarrhea, right-lower-quadrant pain, and a tender mass in the same area. As in any case of amebiasis, diarrhea may not occur, but constipation may be present. Although roentgenographic study with a barium enema may suggest the diagnosis, it must be remembered that confusion of the diagnosis with that of carcinoma may occur and the differential diagnosis be virtually impossible. In most cases the stools are positive for Endamoeba histolytica. However, these may not be found, but on the other hand the presence of amebas in the stool is no guarantee that the colonic mass is not a neoplasm.

—*Le Roy F. Kleinsasser, M.D.*

Primary Tumors of the Vermiform Appendix; A Clinicopathologic Approach. THOMAS W. BOTSFORD, WILLIAM E. JAQUES, and ROY CLAUS. *Am. Surgeon*, 1954, 20: 585.

THE management of primary tumors of the appendix is difficult for two reasons: (1) argentaffinomas, as the authors prefer to classify the so-called carcinoid, has a disputed malignancy, and invasion of the submucosa, muscularis, serosa, and lymphatics by these tumors is reported, and (2) adenocarcinoma of the appendix is so rare that the true biologic characteristics of the lesion are not known.

Histologic grading of the argentaffinomas in this series was not attempted. However, their invasiveness was noted; 17 of 27 would be classified as invasive. The unusually high incidence of argentaffinoma in females is explained by the large number of incidental appendectomies performed in women during the course of other procedures.

The other primary tumors that were found were adenocarcinomas, mucoceles, and fibromas. These offered no problem in diagnosis or management.

The authors believe that a right hemicolectomy should be performed when a diagnosis of adenocarcinoma can be made histologically. Appendectomy alone is generally sufficient therapy for appendical argentaffinoma because of its frequent location at the distal portion of the appendix. If, however, the tumor is transected at the base and the lesion is invasive histologically, hemicolectomy should be considered.
—*Harold M. Unger, M.D.*

One-Stage Resection in Selected Cases of Sigmoid Diverticulitis. ROBERT M. MOORE and O. T. KIRKSEY, JR. *Ann. Surg.*, 1954, 139: 826.

DURING the last 5 years, 22 patients with diverticulitis of sufficient degree to require surgery were operated upon by the authors. Of these 22 patients, 15 were males and 7 were females. The ages ranged from 37 to 78 years of age, the average age being 56 years.

In 14 of the 22 patients coming to surgery for diverticulitis a sigmoid resection was done. One patient already had had a colostomy, and in a second case a preliminary colostomy was performed 2 weeks before resection. Each of the other 12 patients was treated by primary resection with end-to-end anastomosis. In no patient was a supplementary transverse colostomy established at the time of resection, but in 5 patients a temporary cecostomy of a modified type was done. There was no operative death or hospital mortality in connection with the 14 resections.

In all patients the bowel was prepared for resection with an intestinal antibiotic. At the time of operation a rectal tube was in place, with an indwelling catheter in the bladder, this catheter being left open. Resection of the sigmoid was accomplished through a lower left paramedian incision, the left rectus muscle being retracted laterally. In those cases in which it seemed desirable also to resect much of the descending colon, mobilization of the splenic flexure was accomplished through a separate oblique left subcostal incision, as for splenectomy.

From our limited experience with primary resection in diverticulitis, it is concluded that primary resection should be limited to cases in which the colon can be emptied and prepared adequately with an intestinal antibiotic. One-stage resection and anastomosis should also be restricted to cases in which the surgeon finds at operation that the sigmoid and descending colons can be mobilized adequately, in order that such mobilization will not result in injury to adjacent organs such as the bladder, and that after resection the anastomosis can be done with bowel ends which are grossly normal and under no tension.

In the management of sigmoid diverticulitis, one must constantly keep in mind that carcinoma of the sigmoid may be mistaken for diverticulitis, and that carcinoma may develop in patients who actually have diverticulitis. —*Stephen A. Zieman, M.D.*

Hirschsprung's Disease in the Newborn. RUSSELL R. KLEIN and ROBERT A. SCARBOROUGH. *Am. J. Surg.*, 1954, 88: 6.

THE AUTHORS present their experience with the management of Hirschsprung's disease in newborn infants. Five such patients were treated by them. Case reports accompany the presentation.

The frequency of this disease is difficult to determine, but it is uncommon in occurrence. Absence of ganglion cells in the myenteric plexus of the sigmoid and rectum is the generally accepted etiology. Early diagnosis is important and is made on the clinical and x-ray findings. Regurgitation, vomiting, abdominal distention, and poor bowel function are common findings. A palpable narrowing of the rectum is often present. Some authors consider it pathognomonic. This finding was present in 2 of the 5 reported cases. Typical roentgenographic findings are (1) dilatation of both large and small intestine on a plain film with absence of gas in the rectum; (2) disparity in the diameter between the dilated colon and the nondilated rectum; and (3) evidence of poor evacuation of the colon. Differential diagnosis involves ruling out various other causes of intestinal obstruction such as imperforate anus, atresia, malrotation, intussusception, and meconium ileus.

Treatment depends greatly on early diagnosis. The present reported high mortality results from error and delay in diagnosis. Prompt colostomy just proximal to the aganglionic segment is the procedure of choice. Biopsy at the level of colostomy to demonstrate the absent ganglia is very useful. Improvement follows. Definitive surgery, with resection of the aganglionic segment and restoration of bowel continuity, should not be done until the child is 2 to 3 years of age.

Three of the reported 5 patients (60%) died. The authors believe that early diagnosis and prompt treatment as described should lessen the high mortality and secure good end results. —*Donald C. Geist, M.D.*

Carcinoma of the Rectum at Advanced Age. RICHARD B. CATTELL. *Surg. Clin. N. America*, 1954, 34: 721.

A STEADILY increasing number of patients of advanced age with carcinoma of the rectum is being encountered. Abdominoperineal resection can be carried out in a selected group of these patients who are reasonably active for their age and mentally alert. An operative mortality of 25 to 30 per cent can be anticipated. The family must be made aware of this operative risk. The aim of operation should be to relieve the patient from the symptoms and to provide comfort rather than to prolong life.

The cases of 8 patients 80 years of age are reported. There were 2 postoperative deaths and 1 early subsequent death after discharge from the hospital, all from cardiovascular causes.

These reported experiences properly represent what can be anticipated if operation is elected for carcinoma of the rectum in patients of advanced age.
—*Ely Elliott Lazarus, M.D.*

LIVER, GALLBLADDER, PANCREAS, AND SPLEEN

Acute Cholecystitis in the Aged. BENTLEY P. COLCOCK. *Surg. Clin. N. America*, 1954, 34: 697.

SURGICAL intervention in the elderly patient is associated with an increased risk. This increased risk can be minimized, however, by careful preoperative evaluation, a rapid but complete operative procedure, and by special care during the postoperative period.

The author prefers the use of spinal anesthesia unless there are definite contraindications. Cholecystectomy is the operation of choice, and cholecystostomy is reserved only for the very poor operative risk.

It should never be forgotten, in evaluating the risk of surgery in the aged patient, that temporizing, conservative treatment, particularly in the presence of cholelithiasis, carries its own risk which may well be higher than that associated with a well planned operative procedure. —*Ely Elliott Lazarus, M.D.*

Cholangiography in Infancy; An Aid in the Operative Diagnosis of Biliary Obstruction. N. O. Ericsson and U. Rudhe. *Acta chir. scand.*, 1954, 107: 275.

The authors recommend routine use of cholangiography in conjunction with surgical exploration of infants with prolonged jaundice. This procedure gives useful information as to the presence and patency of the intrahepatic as well as the extrahepatic ducts.

A comparable study on autopsy material showed that in infants the extrahepatic ducts and intrahepatic radicles are essentially comparable in size and distribution to those of adults.

An exploratory examination was carried out in 11 infants and cholangiography was performed in 8 of these cases. It reduces time-consuming dissection, and is far less traumatic than the passage of sounds. Cholangiography gives further information of the anatomy of the biliary system without increasing the operative risk, and may constitute a basis for earlier exploration. —*S. Lloyd Teitelman, M.D.*

The Hepatic Ducts; Surgical Approach for Resection of Tumor. Grayton Brown and N. Myers. *Austral. N. Zealand J. Surg.*, 1954, 23: 308.

An operative technique for the surgical approach to the porta hepatis is described.

At the first stage the biliary tree above the tumor is decompressed with a drain tube. This first stage is sometimes facilitated by splitting Glisson's capsule around the porta hepatis and dissecting upwards in a plane between the capsule and the liver. Three weeks after decompression, the liver usually is found to be decreased in size and the patient is in better physical condition to undergo a radical operation.

The second stage consists of a right thoracoabdominal approach through the eighth interspace, dividing the diaphragm down towards the hiatus of the inferior vena cava. The liver is mobilized by dividing both the ligamentum teres and the coronary ligament. The liver then can be rotated upwards partially through the split diaphragm into the thorax so that the porta hepatis faces upwards. This enables the duct system to be dissected free of the hepatic arteries and the portal veins into the porta hepatis. The tumor, together with the gallbladder and the supraduodenal portion of the common bile duct, can then be removed. The right and left hepatic ducts are anchored together by means of a single silk suture and the resulting figure-of-eight opening of the ducts are anastomosed, by a single layer of interrupted silk sutures, to a defunctioned loop of jejunum, with use of the Roux-en-Y method of anastomosis.

Two cases are reported in which excision of carcinomas of the junctional region of the hepatic ducts was performed. One patient, a male aged 35 years, has remained in good health, without jaundice, for a period of 8 months; the other, a male aged 74, died of liver failure following infarction, 4 days after excision of the tumor; postmortem examination revealed complete removal of the tumor and no evidence of secondary deposits.

The authors strongly recommend bold removal of these tumors, after preliminary drainage of the ducts to improve liver function and decrease the size of the liver. —*Edmund R. Donoghue, M.D.*

Traumatic Pancreatitis. Walter F. Becker. *Am. Surgeon*, 1954, 20: 525.

Although operative injuries are most often the cause of traumatic pancreatitis, a review of 109 consecutive cases at the Charity Hospital in New Orleans revealed that in 5 per cent (6 cases), acute pancreatitis had its inception with blunt trauma to the abdominal wall. The author believes that nonpenetrating injuries as a cause of acute pancreatitis should receive more emphasis.

There are no classical signs and symptoms indicative of injury to the pancreas. Frequently signs from associated injuries overshadow those arising from the pancreas. When there is incomplete rupture of the pancreas, the patient may be quite comfortable initially; but as the bleeding continues and acinar secretions distend the pancreatic capsule, there will be progressive increase in pain and, when the capsule ruptures, the picture of an abdominal catastrophe will follow. If the capsule is ruptured initially, the patient will be gravely ill at the onset.

Awareness of the possibility of pancreatic injury will increase the incidence of correct diagnosis. Repeated serum amylase determinations are indicated in all suspected cases.

Even though the correct diagnosis of traumatic pancreatitis is made, the possibility of associated visceral injury and massive hemorrhage and disruption of major pancreatic ducts makes abdominal exploration mandatory. The exact procedure at operation depends upon the circumstances, but as a rule it consists of the control of hemorrhage, evacuation of hematomas and drainage of the lesser sac. Complete ruptures are closed with nonabsorbable sutures; the severely lacerated pancreatic tail may be excised and the stump of the body of the pancreas closed with interrupted mattress sutures. When the pancreas is severed in two halves, the severed ends are closed with nonabsorbable sutures and the area drained. Duct implantation is not indicated.

Postoperative management is directed towards: relief of pain, correction of fluid, electrolyte, and blood volume deficit, prevention of infections, abdominal distention, and hypocalcemia, reduction in pancreatic secretions, the detection of disturbances in glucose metabolism, and the later complications such as pancreatic cysts and abscesses.

Hypocalcemia may occur in an occasional patient because large quantities of calcium may be deposited in areas of fat necrosis. Diabetes mellitus may occur with acute pancreatic necrosis, and, unless its possibility is kept in mind, it may be unrecognized particularly in the postoperative period.

There were no deaths among the 6 cases reported. Four of the patients were involved in an automobile accident and 3 of these gave a history of steering-wheel injury to the epigastrium. Of the remaining 2 patients in the series, one had fallen and struck his abdomen, and the other was an 8 year old girl who had been struck in the abdomen by a turnstile. All patients at one time or another had been acutely ill and required vigorous therapy.

Surgery was performed in all cases except that of an 8 year old girl who had been injured in an auto accident. She sustained head and chest injuries and also had signs of abdominal injuries. Twelve hour serum amylase was elevated, but, because of the other injuries, conservative management of the abdominal injury was decided upon.

Of the 5 patients who underwent surgery, various degrees of pancreatic injury were seen, from complete pancreatic division to severe edema with fat necrosis.

—Yoshio Sako, M.D.

Metrorrhagic Purpura and Indications for Splenectomy (Les purpuras métrorragiques et les indications de la splénectomie). Ed. Benhamou, R. Bourgeon, and B. Ferrand. *J. chir.*, Par., 1954, 70: 369.

During the period of reproductive life uterine hemorrhages occur frequently in the course of thrombocytopenic purpura. The ages of 9 patients observed by the authors ranged from 14 to 44 years. Gestation aggravated the condition only in 1 patient, while in 5 patients the first signs appeared after several preceding pregnancies. Miscarriages were not encountered in this series and no signs of the disease could be detected in the newborn.

A hemorrhage from the genital organs may be the first sign of the disease or may occur many years after bleeding from other organs. Menorrhagias exceed (in frequency) metrorrhagias, may last from 10 to 20 days, and may be so severe as to threaten life. In the authors' series the spleen was palpable only in 2 cases. In the majority of patients vaginal bleeding is accompanied by cutaneous purpura, epistaxis, hemorrhages in the retina, and bleeding gums.

The diagnosis is based on hematologic studies which disclose numerous immature megakaryocytes in the bone marrow, and on immunohematologic investigations such as Coomb's test and agglutination in vitro, which demonstrate the presence of antiplatelet antibodies in the blood.

The role of the spleen in the pathogenesis of the condition should be kept in mind. The choice of therapeutic measures depends on the acuteness or chronicity of the disease and the presence or absence of auto-antibodies in the blood. Among the conservative measures, blood transfusions, androgenic hormones, cortisone and ACTH occupy the main place. They form the method of choice in cases with auto-antibodies and should also be employed preoperatively and following splenectomy. Removal of the spleen plays the dominant rôle in the treatment of thrombocytopenic purpura, particularly its chronic form.

—Joseph K. Narat, M.D.

MISCELLANEOUS

Actinomycosis of the Subphrenic Space. James A. Ross and Ian C. S. Knight. *Edinburgh, M. J.*, 1954, 61: 170.

A case of subphrenic abscess due to streptothrix actinomycosis, following appendicitis, is reported. The disease progressed to perforation of the diaphragm into the right lung. Drainage of the subphrenic space, bronchial aspiration, and the use of aureomycin produced a successful result.

A very large dose of aureomycin (138 gm. in 43 days) was given orally, with no notable side effects. A further dose of 54 gm. in 18 days was given for a superficial recurrence. The method described is undoubtedly an improvement in the treatment of a condition which previously was considered invariably fatal.

It is likely that further progress in the treatment of the disease will occur as increasing knowledge of the combined use of antibiotics develops.

—Samuel Kahn, M.D.

GYNECOLOGY

UTERUS

Carcinoma in Situ; Value of Cold-Knife Cone Biopsy. W. N. Thornton Jr., L. N. Waters, L. S. Pearce, L. A. Wilson, Jr., and J. M. Nokes. *Obst. Gyn.*, 1954, 3: 587.

The cases of 30 consecutive patients with a punch biopsy diagnosis of carcinoma in situ of the cervix, or with microscopic changes in the cervix suggestive, but not diagnostic, of this disease were presented. These cervical changes were accepted as a challenge to further investigation prior to definitive therapy. The knife-cone biopsy of the cervix is a practical approach.

After complete study, a final diagnosis of no carcinoma was made in 7 patients, of carcinoma in situ in 18 patients, and invasive carcinoma in 5 patients.

The philosophy in regard to the treatment of this disease has been presented on the basis that more accurate information than that obtained by punch biopsies is necessary before definitive therapy is instituted. —*John R. Wolff, M.D.*

Choriocarcinoma of the Uterus; A Study of 74 Cases from the Mathieu Memorial Chorionepithelioma Registry. Emil Novak and C. S. Seah. *Am. J. Obst. Gyn.*, 1954, 67: 933.

This is a clinicopathological study of 74 cases of choriocarcinoma of the uterus observed at the Mathieu Registry. It represents the largest group of choriocarcinomas based on direct study of the pathological material.

The study deals primarily with the pathological differentiation and prognosis of this disease. In this series 39 per cent of the cases followed hydatidiform mole, 38 per cent followed abortions, and 23 per cent were preceded by full term pregnancies.

The authors point out that one must recognize an intermediate group, between choriocarcinoma and benign mole, to include chorioadenoma destruens. This condition is characterized by excessive trophoblastic activity in addition to a well preserved villous pattern. The term is also applied to the moles which invade and penetrate the adjacent tissues. It is pointed out that the presence of villi usually precludes the diagnosis of choriocarcinoma, although one of the authors' cases showed villi.

Anaplasia need not be present to make the diagnosis of choriocarcinoma. It is best made on a histological pattern rather than on cytological detail. The lesion, grossly, is typified by a bulky hemorrhagic tumor, although the primary lesion may be only minimal despite widespread metastases. Microscopically, the tumor is typified by trophoblastic sheets with both Langhans and syncytial elements. It is in the former that one would look for anaplastic activity. The lesions most often incorrectly diagnosed as choriocarcinoma are hydatidiform mole, syncytial endometritis, and chorioadenoma destruens.

In a few of these cases the diagnosis was made by curettage alone. The tumor metastasized via the blood stream. The lungs, vagina, and brain were its most common sites. Both degrees of benign lesions may have pulmonary infiltrates.

The management of choriocarcinoma consists of total hysterectomy and bilateral salpingo-oophorectomy. In benign moles, hysterectomy is indicated in the face of rising hormonal titers after molar evacuation.

Sixteen of the patients in this series survived beyond 6 months. Thirteen have been well for years.

—*Henry C. Falk, M.D.*

Ninth Annual Report on Results Obtained in the Treatment of Carcinoma of the Uterus in 1947 and Previous Years. J. Heyman, M. Donaldson, Joe V. Meigs, and Phil. C. O. Segerdahl. *Ninth Annual Rep. Treat. Carcinoma of Uterus*, Stockh., 1953, Vol. 9.

Included in the report for 1947 and previous years are the statements from 72 collaborators on cervical carcinoma, from 19 on corporeal carcinoma, and from 12 on corporeal and endocervical, ovarian, and pelvic carcinoma.

The report covers 87,424 cases of carcinoma of the cervix, in 93.3 per cent of which treatment was given. The 5 year relative apparent cure rate was 34.7 per cent. It is the highest yet reported. Of the entire group of cases in which treatment was given 17 per cent were in stage 1, 36.7 per cent in stage 2, 35.6 per cent in stage 3, and 10.6 per cent in stage 4. The respective 5 year relative apparent recovery rates were 60.6 per cent, 41.7 per cent, 23.3 per cent, and 6.8 per cent.

Carcinoma of the corpus was reported in 5,480 cases, treatment being given in 96.8 per cent. The 5 year relative apparent recovery rate was 53 per cent.

The distribution by stages was stage 1, group I, 50.0 per cent; stage 1, group 2, 34.6 per cent; stage 2, 15.4 per cent. The corresponding 5 year recovery rates were 68.6 per cent, 44.4 per cent, and 21.7 per cent.

The varieties of pelvic carcinoma are defined and the stages of cervical and corporeal carcinoma are discussed in detail.

A new feature of the report is the addition of a "Collaborators' Corner" to permit the expression of views and queries by the collaborators with comments by the editor. The reports of the collaborators have been assembled and published in concise tabular form in order to describe pelvic tumor varieties, patient management, distribution of stages, and results of treatment. —*George C. Lewis, Jr., M.D.*

ADNEXAL AND PERIUTERINE CONDITIONS

Sertoli Cell Tumors of the Ovary. C. v. Numers and T. Gylling. *Ann. chir. gyn. fenn.*, 1954, 42: 161.

Three cases of Sertoli cell tumors of the ovary, earlier diagnosed as granulosa cell tumors and observed at the First Women's Clinic, University of Helsinki, are presented. All of the patients had passed the meno-

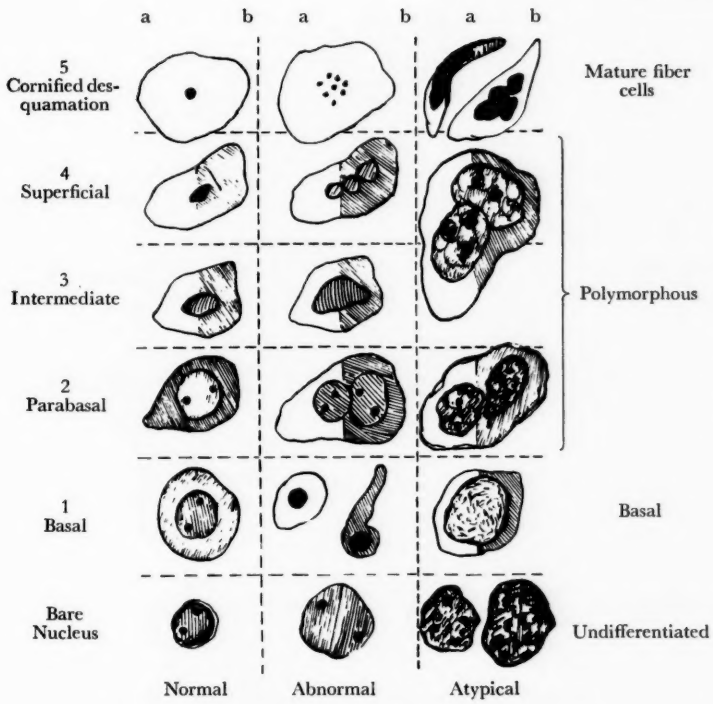

FIG. 1 (Stoll *et al.*) Differentiation; *a*, acidophil; *b*, basophil.

pausal age. All had uterine bleeding, and in 2 it was pseudoperiodic in type. The endometrium showed cystic glandular hyperplasia, indicative of the estrogen production of the tumors. *Alan Rubin, M.D.*

EXTERNAL GENITALIA

Abnormal and Atypical Squamous Epithelial Cells in the Vaginal Secretion (Abnorme und atypische Plattenepithelzellen im Vaginalsekret). PETER STOLL, ERICH MARTIN, and ELISABETH GAULRAPP. *Geburtsch. & Frauenh.*, 1954, 14: 509.

THE AUTHORS suggest a classification of abnormal and atypical cell types in the vaginal secretion based on morphological maturity. Abnormal cells are found in the vaginal secretion in 10 per cent of all cases and should call for repeated examination of the patient. The discovery of atypical cells, on the other hand, is the final purpose of all these screening tests, and it should be followed by more exacting methods like cervical smear, colposcopy, and biopsy.

In the normal cell hormonal stimulation leads to orderly maturation with the onset of normal function: glycogen formation and cornification. Histochemically, the following changes of progressive maturity can be demonstrated: the disappearance of ribonucleoproteids in the parabasal zone with the appearance of a basophil protoplasma reaction, the appearance of a positive polysaccharide reaction, the destruction of the Golgi apparatus, and the depolymerization of the nuclear thymonucleoproteids which do not stain in later stages.

In the absence of the sexual hormone the epithelium is low and consists of the basal and parabasal layers only. Under the influence of androgens, progesterone, and small amounts of follicle hormone the intermediate cell type appears, and with larger amounts of circulating follicle hormone the full scale of cell types will be visible. Typical maturation is characterized by co-ordinated and simultaneous stages of maturity in the nucleus and plasma and in all the cells.

Atypical cells are characterized by unco-ordinated changes in the nucleus and plasma, of varying degree in different cells. Principally they form four classes:

1. In the undifferentiated form the plasma has lost its structure completely and, as an amorphous mass, surrounds the quickly dividing small bare nuclei.

2. In the basal form the division of cells and nuclei into two symmetrical daughter structures is predominant.

3. In the polymorphous form there are well formed plasma masses which can mature to glycogen formation and cornification, but there are bizarre, giant-size, and multilocular nuclei.

4. In the cornified atypical cell form the dense cornified plasma encircles the nucleus so closely that it cannot divide. The higher the division activity of the nucleus, the lower is the functional power of the cell, and the more distorted is the histochemical behavior and reaction that results.

If the cell groups fit neither the normal or atypical classification, they are called abnormal. This cell form is frequently seen after inflammatory processes (especially trichomonas vaginitis), healing erosions, and abortions. The follicle hormone in these cases, in addition to furnishing local treatment, assists the regenerative processes and also clears the smear from abnormal cells in the presence of atypical forms. A differentiation of invasive from preinvasive cells is impossible with the cytological method.

While histological methods in doubtful cases give only a momentary picture and depend largely on the subjective judgment of the examiner, cytological controls give repeated objective results. If the atypical or even abnormal cell type does not return to normal when the irritants are removed, treatment as for carcinoma is indicated.

There is also a limited value of this method in the estimation of the maturity of an existent carcinoma, and the success of radiation therapy.

—*W. D. Bergman, M.D.*

MISCELLANEOUS

The Management of Infertility. T. N. A. Jeffcoate. *J. Obst. Gyn. Brit. Empire*, 1954, 61: 181.

The author asks several questions. Has the management of infertility been of direct benefit to our patients either individually or as a group? If so, what is the extent of the benefit and how has it been conferred? How should the cases of infertility be managed and in what directions do present-day methods of investigation and treatment require modification? These and similar questions are relevant to the review of a subject which appears to be obscured by clouds of fantasy, wishful thinking, false premise, and quack remedy, as much today as in the days of love potions and fertility amulets.

A few years ago 700 cases of primary sterility seen by the author or in the clinic 3 to 17 years previously were traced, and 90 per cent of these were found. Every woman was required to have had 2 years' real opportunity for conception and all were included in the analysis—whether or not they had been investigated and treated, whether or not some lesion had been found which necessitated hysterectomy or other radical procedure, no matter how sterile their husbands or how closed their tubes. The longer the period of follow-up, the greater the number of women who were found to have been pregnant. More than 46 per cent of the women had in fact conceived, and it could be calculated that if all had been followed until the menopause not less than 50 per cent could have had at least one pregnancy.

In the vast majority of cases, dilatation of the cervix, curettage, and one or another tubal patency test were the only treatment administered, and nothing was given except advice. Moreover, judging by the time at which conception occurred in relation to treatment, there is good reason to believe that in not less than 50 per cent, and probably in 60 per cent, of the cases the pregnancy resulted by chance and was entirely unrelated to any treatment given.

There are only 4 basic investigations which are of any real practical value in the management of infertile marriage.

The clinical history and examination of both partners should not be done in a perfunctory manner. It should be emphasized that there is a need to exclude coital problems—failure to penetrate, infrequent coitus, coitus at the wrong time, and above all male impotence.

In semen analysis, there is no agreement on the significance and relative importance of features such as volume of fluid, sperm density, total count, motility and morphology. Density appears to be the most valuable single guide and motility the least significant. The need for care in interpretation, however, is illustrated by the fact that in the series of cases mentioned, 33 per cent of men not azoospermic but with a count of less than 10 million per cm. were ultimately responsible for a pregnancy, while the figure was only between 50 to 60 per cent among the men with a count of more than 60 million. Poor quality semen is not so serious a matter as is sometimes suggested; it may delay conception but a pregnancy will occur sooner or later in a large proportion of cases. Here, again, is a background against which must be weighed any claims for the successful treatment of male infertility by thyroid, testosterone, gonadotrophin, vitamin E, and by ACTH.

Despite the fact that insufflation tests were always tried not less than 3 times, a negative finding was proved (by hysterosalpingography or by pregnancy) to be fallacious in 37 per cent. A positive result was found (by laparotomy or by hysterosalpingography) to be fallacious or misleading in 8.6 per cent.

Histologic and bacteriologic examination on the endometrium should be carried out under anesthesia. It is important from the standpoint of estimating ovarian function and excluding genital tuberculosis. Uterine hypoplasia per se causes no infertility. If it is present and is the result of ovarian hypofunction, it is the absence of ovulation associated with the latter which requires treatment. If, on the other hand, hypofunction occurs despite adequate ovarian function, then no amount of hormone therapy will influence it. The administration of estrogens and progesterone for supposed hypoplasia or for hypothetical recurrent early abortion is without sound foundation, and has never been proved to have any value so far as the treatment of infertility is concerned.

Absent or infrequent ovulation is nearly always indicated by the menstrual history. Anovulation is certainly not the first cause to look for, and painstaking daily recording of the temperature ought not to be the first line of investigation. It may be useful for a few months when the menstrual cycle is unusual and there is need to determine the fertile period; it may be carried out as a last resort when no other infertility factor can be found and the woman remains childless. Many women, however, and (surprisingly) their medical attendants too, seem to think that keeping a temperature chart will help them to conceive.

On the contrary it is a daily reminder of their complaint, and may well hinder rather than encourage conception. Even if the menstrual cycles are proved to be regularly anovular, there is no form of hormone or other therapy which can be prescribed with confidence in its success.

The chief risk of dealing with infertility is that it may react badly on the partners of the marriage. It is better to live in hope than to know the worst, so it seems wise never to tell any individual or couple that they are sterile—even if one could be sure that they are. Moreover, nothing should be said which will enable one partner to blame the other; wherever possible, infertility factors should be distributed between them. It should be recognized too that in all cases there is an optimum time at which to halt all diagnostic and therapeutic measures, and to persuade the patients to direct their attention to other matters; otherwise, a complaint is turned into an obsession.

While it is true that in isolated cases the correction of some obvious abnormality in structure or function is dramatically successful, the evidence so far available goes to show that the handling of cases of infertility is of limited value except from the standpoint of prognosis, and even that can be woefully inaccurate. Nevertheless, it would be wrong to underestimate the importance of the comfort of mind which the investigation and treatment of their problem brings to those who are childless. Even if nothing comes of it, the infertile couple have the satisfaction in later years of being able to look back and feel that they at least took all humanly possible steps to remedy the matter. Fortunately, or unfortunately, they do not realize that the remedy is, as yet, rarely within the bounds of human knowledge and skill, so it is not surprising that those who ultimately achieve a pregnancy usually fail to "render . . . unto Caesar that which is Caesar's", and credit is given where no credit is due. In receiving it, however, let us not deceive ourselves.

—*Charles Baron, M.D.*

Pelvic Tumors Other than Fibromas of the Ovary with Ascites and Hydrothorax. Joe Vincent Meigs. *Obst. Gyn.*, 1954, 3: 471.

Meigs' syndrome, or Demons-Meigs' syndrome, is defined by the author as being limited to patients with (1) ovarian fibromas, thecomas, granulosa cell tumors, and Brenner tumors; (2) ascites; (3) hydrothorax; and (4) cure after removal of the tumor.

An arbitrary division has been made between fibrous (fibromas, granulosal cell tumors, thecomas, and Brenner tumors) tumors and epithelial cysts, teratomas, and malignant lesions in defining the true Meigs' syndrome.

This division is made because there are so many more of the fibrous types of tumors responsible for the syndrome than the epithelial and teratomatous types, which are far more common than the fibromas.

Possible mechanisms of production of the ascites and hydrothorax are discussed.

It is true that some malignant ovarian tumors may have accompanying ascites and pleural effusion. The chest fluid not only vanishes upon removal of the ovarian neoplasms, but the fluid is not due to metastases, nor does it contain malignant cells that can be recognized by the cytologic method.

The importance of the knowledge of the possible significance of chest fluid in pelvic tumors is very great, for some patients considered as hopeless may be curable.—*Alan Rubin, M.D.*

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Hemodynamic Characteristics of the Fetal Circulation. S. R. M. Reynolds. *Am. J. Obst.*, 1954, 68: 69.

Why does the fetus show prompt bradycardia in the face of circulatory distress upon prolonged contraction of the uterus, when in adults the cardiac response is one of prompt acceleration to circulatory stress? By regarding fetal stress bradycardia as a paradox, we reveal our conventional attitude. We expect the fetus to behave like a postnafal organism, for that is our principal point of reference.

It may be expected, therefore, that the fetus possesses features that are uniquely adapted to a nonbreathing and aquatic organism of which the most vital part is the placenta. The cardinal function of the circulation of the fetus is to provide abundantly for the movement of blood through this organ until the moment of birth. Then the placenta becomes a waste product of parturition.

The cardinal differences between the fetal and neonatal circulations are clear. They are basically threefold. There is the fact (1) of the abundant and important placental circulation in the fetus, (2) of the crossover by way of the foramen ovale of blood between the two auricles or receiving chambers of the heart, and, finally, (3) the shunt between the two arterial systems from each side of the heart by way of the ductus arteriosus. At the moment of birth, each of these becomes nonfunctional and the newborn organism normally breathes from that time in the adult fashion with all that this entails in readjustment of the vascular system to the altered conditions of life. These are structural and functional changes which must, and do, transpire with remarkable rapidity.

Fetal bradycardia is a sign of fetal circulatory distress, and if it is followed by an excessively fast heartbeat, the fetus has been and still is in extreme distress. The sympathetic nervous system responds by causing an outpouring of adrenaline into the blood stream.

One other fact of academic interest has come out of recent work. The view is now held that, near term, vagal tone develops in the fetus and this is marked by a slow resting heart rate. Critical evaluation of the situation in new experiments in fetal lambs suggests, however, that there is no appreciable vagal tone in the fetus at rest before birth. However, the slightest degree of fetal circulatory distress induces demonstrable vagal tone. Similarly, there is no evidence of carotid sinus or sympathetic tone in the fetus, although activity over all these reflex pathways may be initiated by adequate stimulation.

It appears that the lamb fetus in utero is normally protected from stressful situations so that the reflex mechanisms of cardiac control do not function, even though they are demonstrably capable of it. An essential element of vagotonia is that the organism must be exposed to frequent or continuing conditions of stress in the external environment. The fetus in utero is relatively free from such stresses. In adult animals, such as dogs and human beings, inactivity and lack of the stress of training lead to a loss of physiologic conditioning. This includes reduced vagal tone. Just so, the fetus fails to exhibit those attributes which are associated with physiologic conditioning. For this reason, no doubt, the fetus in utero appears to react "paradoxically" to circulatory stress, for the cardiovascular system is operating at rest without benefit of measurable vasomotor tone comparable to that of postnatal animals. One should not expect, therefore, that the responses of such a system will duplicate those of the adult who has cardiac autonomic tone. Such an explanation accords with the observations made in the lamb fetus and is consonant with the generally accepted knowledge of the development of vagal and sympathetic tone in postnatal animals.

—*Harry Fields, M.D.*

The Placental Transfer of Amino Acids in Normal and Toxemic Pregnancy. C. A. B. Clemetson, and J. Churchman. *J. Obst. Gyn. Brit. Empire*, 1954, 61: 364.

The plasma alpha-amino-nitrogen levels of the maternal and fetal blood from 43 patients are presented. In every case the fetal level was higher than the maternal. The normal fetal maternal alpha-amino-nitrogen ratio was found to be 1.65 to 1. This ratio was reduced to 1.56 to 1 in mild toxemia and to 1.37 to 1 in severe toxemia.

When the umbilical cord was coiled around the baby's neck at birth in otherwise normal cases, the ratio was decreased to 1.38 to 1.

These changes in the fetal-maternal alpha-amino-nitrogen ratio were brought about by a rise in the maternal level rather than by a fall in the fetal level.

The low maternal plasma amino-acid level in pregnancy is caused by the active transfer of amino-acids to the fetus. The placental function of transferring amino-acids to the fetus is impaired in toxemia of pregnancy.

—*Alan Rubin, M.D.*

Alterations of Potassium Metabolism in Pregnancy. Seymour L. Romney, John P. Merrill, and Duncan E. Reid. *Am. J. Obst.*, 1954, 68: 119.

Alterations in the potassium metabolism have been encountered in pregnancy. It is the object of this report to direct attention to the potential dangers of hypokalemia or hyperkalemia as encountered in the obstetrical patient. It is not intended to imply that potassium imbalance is a consistent complication of these several obstetrical conditions.

Because of the positive sodium balance in normal pregnancy, hypokalemia might be more easily produced under conditions of poor potassium intake and prolonged vomiting. Furthermore, the alkalosis that may be produced by vomiting in itself may aggravate continued urinary losses of potassium. When kidney function is acutely impaired with resultant urinary suppression, the hazard of hyperkalemia is well recognized. Conditions exist in pregnancy which are con-

ducive to an abrupt development of the hyperkalemic syndrome in the oliguric phase of acute renal failure. The dissolution of decidua and placental site tissue following delivery or the destruction of erythrocytes in areas of concealed hemorrhage in severe premature placental separation represent extra sources of endogenous potassium. It thus may be anticipated that the pregnant patient with acute renal failure may develop potassium intoxication more readily than the nonpregnant individual. This poses the question whether hyperkalemia with resultant functional cardiac disintegration is the mechanism of death in some of the fatal cases of acute renal failure in pregnancy.

Hypokalemia was detected in patients with severe hyperemesis gravidarum; the resultant symptoms responded dramatically to potassium replacement.

The suggestion is offered that in patients with severe or marked forms of hyperemesis gravidarum the status of the potassium metabolism be carefully evaluated.

Hyperkalemia was encountered in 3 cases of various complications of pregnancy associated with acute renal failure. In all cases, a hypotensive episode was believed to be the basis for the renal changes.

Hyperkalemia as a complication of acute renal failure is believed to develop more rapidly in the pregnant than in the nonpregnant patient. The involuting placental site and decidua are regarded as additional sources for the release of potassium.

The unpredictable tendency toward rapid potassium accumulation may warrant transfer of the obstetrical patient with acute renal failure to a medical center where earlier dialysis with the artificial kidney may be performed when indicated.

—Harry Fields, M.D.

Deflexion Attitudes of the Fetus in Utero, with Special Reference to the Etiology and Diagnosis of Face and Brow Presentation. THOMAS G. WHITE. *J. Obst. Gyn. Brit. Empire*, 1954, 61: 302.

THE AUTHOR proposes that contrary to most teaching, deflexion attitudes, as in face or brow presentations, are primary conditions, not secondary to abnormalities of the uterus or other parts. He suggests the cause to be excessive tone in the extensor muscles.

He states that because of the multiplicity of causes assigned to deflexion attitudes, the probabilities are that none of the factors causes them. Particularly, he states that contracted pelvis, long blamed as a factor in this condition, probably has nothing to do with it as large series of cases of contracted pelvis show no brow or face presentations. Also, a poorly flexed head not only feels bigger because it remains high in the pelvis, but it is more difficult to deliver and gives the impression of a small pelvis even when measurements are normal.

He concludes from a study of reported cases that there is no acceptable evidence that contracted pelvis, disproportion, coils of umbilical cord around the neck, or the posterior position cause face or brow presentations. He defines primary deflexion attitudes as those in which the brow and face presentations occur before the onset of labor.

The author states that the normal attitude of the fetus in utero is one of flexion. This is due, he says, to slightly greater tone in the flexor muscles as opposed to the extensor muscles.

If it is accepted that these abnormal presentations are due to increased tone in the extensor muscles, then they should be present in others besides vertex presentations and also should be found after birth. This, he concludes, is true and he cites cases from the literature.

He states that radiological evidence before labor is the only accurate method of determining the condition and its incidence, and a recent increase in the incidence of deflexion attitude is due, he says, to increased use of the x-rays. He concludes that contrary to popular belief secondary face and brow presentations are rare, if they occur at all, and that the various conditions listed as causes by most textbooks are not valid. Hyperextension of the fetal head due to increased tone of the extensor muscles is common, regardless of the presentation.

Finally, he concludes that most, if not all, face or brow presentations are primary because of the increased tone in the extensor muscles of the back or neck. Suspected cases can be confirmed with x-rays.

Byford F. Heskett, M.D.

Hardness and Growth of the Fetal Head. IAN MACDONALD. *J. Obst. Gyn. Brit. Empire*, 1954, 61: 253.

THE RATIONALE of premature induction of labor in cases of suspected minor cephalopelvic disproportion is based on the assumptions that the fetal head gets larger as pregnancy advances, and also that the head becomes harder and less able to mould as term approaches. The first of these assumptions, namely, that the growth of the fetal head is continuous throughout pregnancy, is a common sense belief supported by some evidence resulting from measurements. The second assumption is based purely on clinical experience and it does not seem likely that any clinician would doubt that the head becomes harder and less mouldable as the fetus gets older. The purpose of this article is to consider the significance of that growth, and to express objectively the clinical observation associated with hardness and moulding.

The size of the fetal head in the biparietal, occipitofrontal, and suboccipitobregmatic diameter was measured with calipers in 1,083 cases, the rate of growth being found by relating the size of the diameter measured to the age of the fetus as calculated from the maternal menstrual history. It was shown that in the last weeks of pregnancy, growth in the biparietal and occipitofrontal diameters was approximately 1 mm. a week while in the suboccipitobregmatic diameter growth was less, being about 0.8 mm. a week, there being no cessation of growth in any of the diameters measured. Furthermore, it was found that the diameters measured were larger in the male than in the female for corresponding lengths of gestation.

From these measurements it was possible to calculate the area bounded by the circumference having the biparietal and suboccipitobregmatic diameters as axes. This area is that normally presented to the birth canal and is the smallest cross-sectional area that the head can form by flexion.

There is an increase of approximately 7 sq. cm. in the size of the area of normal engagement of the head

between the thirty-sixth and fortieth weeks of pregnancy, an increase of about 10 per cent. This proportional increase in the normal area of engagement is the same for each sex, though the absolute measurements are greater in the male fetus. This might be due to a true sex difference or merely to smaller female birth weight.

The head of the male fetus is larger than that of the female for corresponding lengths of gestation and for corresponding birth weights.

Tests designed to assess "hardness" of the parietal bones showed that as the fetus matures, its parietal bone increases in thickness and in its resistance to a standard deformation.

The rim of the parietal bone increases in thickness at a greater rate than the center, thereby forming a more rigid "splint" for the whole bone as pregnancy advances.

There is increased calcification of the parietal and frontal bones of the fetus as it becomes older.

The head of the post forty-week fetus was larger and its parietal bones were thicker, less liable to be flattened, and had increased calcification compared with younger fetuses, and there was no evidence at 40 weeks of a cessation or retardation of the processes making the head larger and less mouldable, the conclusion being that postmaturity is associated with a normal increase of growth and hardness of the fetus.

—Harry Fields, M.D.

Etiological Aspects in the Problem of Toxemia of Pregnancy. M. A. VAN BOUWDIJK BASTIAANSE. *Am. J. Obst.*, 1954, 68: 151.

IN THE STUDY of the etiology of toxemia of pregnancy it is essential to determine the conditions under which toxemia may appear. As early as 1925 Beker showed that it is most likely to occur in the event of an increased resistance in the blood vessels of the pregnant uterus. This is the case when, among other conditions, the uterus is stretched tightly around its contents (primiparas, multiple pregnancy, hydramnios) and when the vessels are not sufficiently wide, which may be due either to the fact that the vascular system is hypoplastic or to the appearance of anatomic changes in the vascular wall (arteriosclerosis) which prevent adequate dilatation of the vessels. Detailed investigations showed that toxemia of pregnancy is superimposed upon a (possibly latent) vascular disease in approximately 75 per cent of the cases. The lumen of the artery is not the only factor, however. The incidence of toxemia will also increase when there is a greater amount of placental tissue, as in hydatid mole, multiple pregnancy, and the presence of a large fetus.

In view of these facts a relative decrease in the quantity of blood flowing to the placenta may be regarded as a possible cause of the occurrence of toxemia. Thus, the same kind of thing might be thought to occur in a placenta with an inadequate supply of blood, as when an insufficient quantity of blood flows through a kidney.

To study the etiology and the most satisfactory method of treatment, one should always be sure that the case is toxemia of pregnancy. When there is no hypertension, toxemia may be definitely excluded.

Toxemia may result in eclampsia and in abruptio placentae, the latter being most likely to occur when the vessels are arteriosclerotic.

Toxemia of pregnancy probably is due to an insufficient supply of maternal blood to the placenta. Various acute experiments are reported. So far, the correct method in chronic experiments has not been found.

Abruptio placentae, Couvelaire uterus, necrosis, and hemorrhages in other parts of the body, as well as necrosis of the cortex of the kidney, are due to ischemia caused by a considerable fall in the blood pressure which is associated with marked constriction of the arterioles.

Stimulated by articles published by Smith and Smith, the authors have administered estrogens to many patients with toxemia, according to the method suggested by the Smiths, on the assumption that this would increase the blood supply of the uterus. There were neither drawbacks nor advantages to this treatment.

—Harry Fields, M.D.

Heart Disease in Pregnancy. PER BERGMAN and SVEN SJÖSTEDT. *Acta obst. gyn. scand.*, 1954, 33: 117.

THE AUTHORS of this article review (1) the changes in the cardiovascular system during pregnancy, (2) the clinical importance and frequency of heart disease in pregnancy, (3) the diagnosis and classification of heart affections and the evaluation of the cardiac, obstetric, and fetal risks, and (4) the management of pregnant cardiac patients as a background for an analysis of 399 pregnancies in 291 patients which were complicated by heart disease. They were 211 cases with acquired valvular heart affection, 24 cases with congenital heart disease, 14 cases with chronic myocardial insufficiency (cardiac arrhythmia), 4 cases with cor pulmonale, and 38 cases with diagnosis not specified, heart disease doubtful.

Six patients had 10 or more pregnancies. Fifty-three pregnancies terminated in abortion, 23 were spontaneous, and 30 were provoked. There were 3 extrauterine pregnancies. The maternal mortality with a viable fetus was 0.87 per cent. The maternal mortality in the entire obstetrical material was .07 per cent. Three cases were terminal—1 in eclampsia and 2 with heart disease. Of 43 deaths in the obstetrical material, 2 were from heart disease, or 4.7 per cent. The frequency of obstetric complications among cardiacs is negligible when the patient is compensated. The spontaneous abortion rate was not higher. Legal abortions were twice as high in cardiacs. The frequency of forceps delivery in cardiacs was 12.4 per cent and in all of the material 3.3 per cent. Thirty-six forceps deliveries were indicated by the cardiac condition. Sixteen cesarean sections were done: 7 on cardiac grounds, 4 on obstetric grounds, and 5 on a combination of the two. Cesarean sections for cardiac reasons are no longer done. The labors are no longer. Two per cent of the cardiac material evaluated manifested active rheumatic disease (fever in 7, chorea in 1). Three patients had subacute bacterial endocarditis. The frequency of breast feeding was unchanged.

Cardiac complications. No cases of spontaneous abortion became decompensated. After 2 therapeutic abortions decompensation developed. Sixteen women

with viable infants had serious decompensation, 13 immediately before or after delivery, 1 woman 6 days after delivery, and 2 women spent several months in bed.

Two patients died; both had decompensation at the time of delivery. One of them was a 25 year old primipara, and the other was a 35 year old para 2 who had had severe decompensation in her first pregnancy. One patient was delivered by cesarean section and one by forceps. Both had marked bleeding. Their hemoglobin was 51 and 47 per cent. Both had septic puerperal infection. Their deaths occurred in 1943 and 1945, respectively.

All of the patients with auricular fibrillation survived. None of the patients with congenital heart disease showed signs of congestive failure during pregnancy or delivery. —*James F. Donnelly, M.D.*

Pregnancy and Heart Disease. LARS WERKO. *Acta obst. gyn. scand.*, 1954, 33: 162.

THE AUTHOR reviews the present views on heart disease, especially with regard to pregnancy and its influence on the heart and circulation.

Heart disease complicating pregnancy is not common. The rate is from 1.5 to 3.0 per cent. However, heart disease and toxemia of pregnancy still contribute to most of the maternal mortality rate.

The pathophysiological picture of various forms of heart disease is presented. However, all of these studies were made on nonpregnant individuals. Pregnancy causes innumerable changes in the blood and circulation both in normal women and in patients with heart disease. There is a successive increase in the total blood volume up to the ninth lunar month of pregnancy. The blood is diluted with extracellular fluid which gives an increased tendency toward edema. The blood pressure decreases toward the middle of pregnancy and increases again toward term. Venous pressure is increased in the legs but is unchanged in the upper extremities. The skin blood flow and the renal blood flow increase. The renal blood flow is markedly increased during early pregnancy and back to normal values at the end of pregnancy. The intrathoracic blood load remains the same until the last month when it is diminished and it increases again during the puerperium.

The management of patients with heart disease in pregnancy will vary with the individual case. Ideally it should start before pregnancy. Infections and anemia are two threats that constitute real dangers for patients with heart disease in pregnancy, as they may easily tip the balance toward edema.

Alterations of the heart rhythm constitute a special problem. It seems as if pregnancy in some way may increase the tendency toward extrasystoles or paroxysms of tachycardia.

Intelligent management calls for close collaboration between the cardiologist and the obstetrician throughout the pregnancy, in addition to an intelligent patient who will rest when instructed to do so. Indications for cesarean section should be only on obstetrical grounds. It is believed that after the fourth month of pregnancy intervention may be more dangerous than life-saving.

—*James F. Donnelly, M.D.*

Mitral Valvotomy in Pregnancy with 2 Illustrative Cases. ANTONY P. B. HARSTON. *J. Obst. Gyn. Brit. Empire*, 1954, 61: 382.

THE results of valvotomy carried out in pregnant women cannot yet be assessed in view of the recent origin of the operation, but perhaps the following tentative remarks may be made:

1. Valvotomy during pregnancy, in certain selected cases, has been successful over a short period.

2. Selection must be very careful and should be made by physician, obstetrician, and thoracic surgeon in close co-operation in view of the hazards of the operation.

Two case histories of patients operated upon during pregnancy, whose cardiac status improved subsequent to the surgery, are presented. —*Alan Rubin, M.D.*

Acute Appendicitis in Late Pregnancy. R. B. PARKER. *Lancet*, Lond., 1954, 1: 1252.

IN LATE pregnancy the diagnosis of acute appendicitis provides a major problem for the clinician. Six cases encountered at the Birmingham Maternity Hospital, Birmingham, England, are presented in detail to illustrate the delays in the management of appendicitis. There was one maternal death resulting primarily from patient delay. Three deaths of infants occurred: one, a postmortem stillborn infant (associated with the maternal death); another, an unexplained term stillbirth; and a third death was attributed to prematurity.

Physician delay was a prominent feature in 4 patients. In all, there was a misinterpretation of the signs and symptoms, in the belief that they represented either the findings of pyelitis or, in one case, those of accidental occult intrauterine hemorrhage. In the 5 surviving patients the symptoms were right paraumbilical pain or right iliac pain and vomiting. Right-sided abdominal tenderness and slight elevation of temperature were the only consistent signs.

Two patients with short delay in appendectomy had smooth postoperative recoveries. The rest, with prolonged delay, had stormy courses. Antibiotics were always used. Neither cesarean section nor hysterectomy was performed. Three of the 5 survivors went into spontaneous labor and were delivered within 48 hours of operation.

In reviewing the reports of 5 or more cases of appendicitis with pregnancy, it was found that the maternal mortality rate for the last trimester was ten times greater than that of the first 6 months. This difference must be attributed to delays in proper management incident to difficulties in the diagnosis.

—*George C. Lewis, Jr., M.D.*

Ovarian Tumors Complicating Pregnancy; A Review of 45 Surgically Proved Cases. GERALD W. GUSTAFSON, SPRAGUE H. GARDINER, and FRANCIS E. STOUT. *Am. J. Obst. Gyn.*, 1954, 67: 1210.

FORTY-FIVE CASES of surgically proved ovarian tumors, 6 cm. or larger, complicating pregnancy, were found among over 100,000 obstetrical histories from four Indianapolis, Indiana hospitals.

An ovarian enlargement of less than 6 cm. is frequently encountered in early pregnancy. Usually,

this is due to a cystic corpus luteum which in most instances disappears as pregnancy advances; however, when rupture occurs with intra-abdominal hemorrhage, differential diagnosis from ectopic pregnancy cannot be made and laparotomy is indicated. In many instances removal of the corpus luteum will not interrupt the pregnancy, but postoperative progesterone therapy is indicated.

An ovarian tumor, 6 cm. or larger, found in the first trimester is usually a neoplasm and should be removed early in the second trimester unless twisting of a pedicle or rupture necessitates immediate surgery.

Patients operated upon for ovarian tumors in the first and second trimesters may be permitted to go into labor and be delivered vaginally without fear of wound disruption. This was demonstrated in all 21 patients who were operated upon in the first two trimesters and went to term.

Diagnosis of ovarian tumors in the third trimester is increasingly difficult because of the further enlargement of the uterus. There is also the ever present danger of pathologic changes in the cyst, and dislodgement of the fetus by the cyst. All 4 cases in this series were incorrectly diagnosed.

Diagnosis of an ovarian tumor 8 cm. or larger at term warrants cesarean section and removal of the tumor.

Ovarian tumors obstructing the birth canal are subjected to considerable pressure during labor. In the presence of a ruptured dermoid, peritonitis is very likely to occur.

The authors believe that in the case of an ovarian tumor obstructing the birth canal during labor, cesarean section plus removal of the tumor is the safest form of management. To displace the ovarian tumor upward manually is to risk rupture of the tumor. To attempt to collapse the tumor by a needle or trocar through the cul-de-sac permits too great a possibility of intraperitoneal spill of tumor contents. Four of the 5 ovarian tumors obstructing the birth canal in the present series were dermoids.

The possibility of malignancy in ovarian tumors complicating pregnancy must always be considered. Each case must be individualized, and the decision as to management must be based on a careful consideration of all the various factors involved.

—*Alan Rubin, M.D.*

Enterouterine Fistula Following Abortion (Fistule entéro-utérine consécutive à un avortement). P. Moiroud, J. Lamy, and Gastaut. *Bull. Fed. Soc. gyn. obst.*, 1954, 6: 86.

A young woman was seen in the office with reference to the sequelae of a missed abortion of 2 months' duration, and advised to enter the hospital for curettage. This she neglected to do for almost 2 weeks. The following day a curettage was done with the greatest of care.

That same evening the patient began to vomit and the vomiting continued for days; there developed hypogastric pains, abdominal rigidity, and doughy thickening of the adnexae. Antibiotics were administered but did not relieve the manifestations of intestinal obstruction. On the seventh day after curettement, feces passed through the vagina. After this the patient's condition began to improve; however, with the development of vaginal irritative manifestations (high fistula), the authors decided to operate.

Laparotomy disclosed a loop of the small intestine, about 8 cm. above the ileocecal valve, which had become incarcerated in a perforation at the upper end of the uterus and had sphacelated at that part of the intestinal wall which intruded into the cavity of the uterus (mural dehiscence). The two terminal (afferent and efferent) loops of the intestine were cut and the stumps attached to the fistulous tract were ligated; the remaining intestinal ends were reunited independently (end-to-end anastomosis).

A total hysterectomy was carried out and the ligated intestinal stumps were removed en bloc with the uterus and adnexae (shown in Fig. 3 of the original text).

The authors do not believe that the perforation could have been produced directly by the operator; they believe rather that the wound resulted as an indirect laceration of the fundus of the uterus, with downward traction of the curetting instrument along the anterior wall.

The purpose of this report is merely to add an interesting experience to the already long list of complications incident to uterine curettage.

—*John W. Brennan, M.D.*

LABOR AND ITS COMPLICATIONS

Prolonged Labor in Multiparas. R. G. Law. *J. Obst. Gyn. Brit. Empire*, 1954, 61: 331.

An analysis of the records of 1,000 secundiparas delivered at the University College Hospital, London, are presented. After exclusion of the patients in whose first or second pregnancies there were multiple births or cesarean section was required, the duration of labor in the remainder was analyzed.

The following conclusions are drawn:

1. The incidence of prolonged labor in secundiparas is low, being 7.2 per cent for labors of between 24 and 48 hours' duration and 1.1 per cent when labor exceeds 48 hours. Since in many of the cases making up the present series the first labor had been abnormal, the incidence at large may well be even lower.

2. In contradistinction to the rate of operative interference in primiparas in prolonged second labors it is low (2.6%) and shows no tendency to rise pari passu with the duration of labor.

3. The risk to the infant in these cases is small. Although this is probably related to the low incidence of operative deliveries, it may to some extent be due to the virtual absence of cervical dystocia and hypertonic uterine inertia in multiparas.

4. The incidence of puerperal morbidity in multiparas is markedly lower than that in primiparas. This may be due to the low rate of operative intervention in the former group of cases. The relationship of puerperal morbidity to the duration of labor is significant only in the case of primiparas.

5. In the present series no significant relationship existed between the lengths of the first and second labors. It is possible that in a larger series such a relationship might be shown to be present.

6. With regard to the possible etiology of long labor in multiparas, analysis of the present series suggests that cervical dystocia, hypertonic uterine inertia, malpresentations, and disproportion rarely occurred. It is therefore probable that the great majority of such labors represent cases of simple hypotonic inertia, characterized by a low resting tone of the uterus and infrequent, weak contractions. The high rate of spontaneous deliveries indicates that with time the strength of the contractions increases to a satisfactory level, labor thenceforth being uneventful.

—*Alan Rubin, M.D.*

Vacuum Extractor—An Obstetrical Instrument. TAGE MALMSTRÖM. *Acta obst. gyn. scand.*, 1954, 33: Supp. 4.

THE USE OF the scalp forceps has been recommended as a means of speedy delivery from below when a high forceps or craniotomy might otherwise be necessary or when, in cases of uterine inertia, the increased pressure on the fetal head, achieved by pitocin, is undesirable and too delayed in its onset. The scalp forceps appears to shorten labor in eclampsia, in the presence of heart diseases, and other complications. The mechanism for an actual increase in labor pains with the use of well directed axis-traction seems to be derived from an increased irritability in the lower uterine segment and the cervix when the presenting part of the fetus comes in perfect contact with them. The failure of the scalp forceps in many cases is due to the difficulty in keeping it in place for a longer period when the traction is increased.

Applying the principle of Simpson's (1848) rubber cup and later devices, the author has used a suction cup of various sizes fitting different stages of cervical dilatation and connected with a suction machine and handle. By means of a perfect manometer-controlled vacuum within, it can be firmly fastened to the leading part of the fetal head. Special devices safeguard the proper direction of extraction forces.

The instrument has been used in the Women's Clinic of Sahlgren Hospital, Gothenburg, Sweden, in 45 out of 3,422 deliveries in 1953. In 15 cases it replaced a low forceps; in the other 30 instances it helped to solve grave obstetrical difficulties, with uterine inertia as the dominant feature. Only 3 infants were lost, and the method does not seem to entail any increased risk for the infants. In most cases the fetal heart tones did not change during use of the extractor. Some local marks have always healed up satisfactorily. The alternate choice of cesarean section in many of the cases is not discussed.

—*W. D. Bergman, M.D.*

Risk from the Aspiration of Vomit During Obstetric Anesthesia. R. B. PARKER. *Brit. M. J.*, 1954, 2: 65.

SIX CASES, 4 fatal, of the "acid aspiration syndrome" following inhalational anesthesia in obstetrics are described, together with 1 case in which the patient died from inhalation of solid vomit.

The grave examples of the syndrome generally follow vomiting during the induction of anesthesia, and a hypothesis is proposed to explain this.

No single method of anesthesia is adequate for all obstetric cases, but a plea for the wider use of local analgesia is advanced.

In inhalational anesthesia the importance of the stomach tube, a tilting table, and a mechanical sucker are emphasized for the prevention of disaster. The passage of a bronchoscope is regarded as a first essential in the treatment of the established condition. It is suggested that benefit may come from recommencing the anesthetic in order to do this.

When vomiting occurs during the induction of anesthesia, the anesthetist, appreciating the danger of the situation, will encourage the patient to get rid of all vomitus by tilting and suction, and the decision to continue with the anesthetic will be left to his judgment that no aspiration has occurred. If asphyxia develops, solid vomit may have been inhaled. Immediate endoscopy is then indicated for removal of the foreign material.

When, despite precautions, respiratory spasm develops on recovery from the anesthetic, treatment should be given along the following lines:

1. If not already performed, bronchoscopy should be undertaken, since the presence of solid debris in the air passages cannot otherwise be excluded. In order to do this it is suggested that the patient should be reanesthetized. If it be true that spasm is the main cause of the cyanosis, this measure alone should restore the patient to a satisfactory condition. Through the bronchoscope a suction tube should be passed well down the respiratory tree.

2. The use of oxygen is obviously essential, and it might be found advantageous to combine it with helium in a ratio of helium 70 to oxygen 30.

3. Antispasmodics should be given; aminophylline or adrenaline intravenously will be the first choice, but ACTH intravenously might be tried in the light of reported success in the treatment of the status asthmaticus.

4. If the condition improves on reanesthetization and deteriorates when the patient regains consciousness, the possibility of maintaining her under anesthesia for a further period of time should be considered.

—*Harry Fields, M.D.*

MISCELLANEOUS

Maintenance of Pelvic Integrity in Obstetrics. ROBERT N. RUTHERFORD, HOWARD M. LAMBORN, JR., and A. LAWRENCE BANKS. *Obst. Gyn.*, 1954, 3: 581.

THE VAGINA is a fibromuscular sheath which is capable of distention to pass an infant, but whose integrity must be preserved or restored in order to safeguard the supports of the pelvic viscera. There would seem to be real reason to avail ourselves of the present-day relaxation techniques which encourage their acceptance of stretch rather than to resist necessary obstetric distention. This relaxation may be achieved either by the patient's state of mind—the relaxation technique popularized by Read—or by modern anesthetic agents. Our best results would seem to be a combination of these methods.

The present study is concerned with impressions taken from a series of intravaginal pressures done on various types of patients. The instrument used for rough measurements of intravaginal pressure was a vaginotonometer, which consists of a seamless, thin-

walled, sterilizable rubber tube, 2.75 cm. in diameter, 8.0 cm. in length, and with two open tubes leading into the proximal end. One tube is connected to an aneroid manometer from which pressure changes can be read directly. The other tube is clamped off after the rubber vaginotonometer has been inflated with a standard volume of air to give an original base pressure of 90 mm. of mercury. This instrument would seem to be as accurate as the usual blood pressure readings on a similar apparatus.

The cases in this study were sequential cases on a general obstetric service staffed by both obstetric specialists and by general physicians. Five groups of patients were studied.

In group I, 25 primigravidas in early labor were checked in order to establish the average intravaginal tonus before the presenting part descended below the ischial spines.

In group II, the average primigravida pressure was contrasted with that of a similar group of multigravidas who had had either inadequate or no repair following previous delivery.

In group III, the percentage of tonus in both groups, I and II, were tabulated after routine episiotomy and repair, immediately after delivery, and at 3 months post-partum.

In group IV, primigravidas were included who were delivered without routine episiotomy, but who were repaired if obvious lacerations took place.

In group V, the pressures were recorded of multigravidas without previous repair, before and after routine repair was done.

It would seem that preservation of the pelvic supports is made more likely by the use of regional types of obstetric anesthesia, associated with a routine colpoperineorrhaphy. The influence of premedication is not significant in muscle relaxation in the experience of the authors, but may be of subjective aid. Prompt resumption of the dynamic function of the pelvic supports is encouraged. The results are weighted markedly by the patient's own tissue vigor, which may account, in major degree, for poor results otherwise unexplainable in repair work. Slow resumption may be recognized by a simple vaginotonometer, and possibly improved by active resistance exercises.

—Harry Fields, M.D.

Pelvic Insufficiency During Pregnancy and After Parturition; a Clinical Study. DAVID BEREZIN. *Acta obst. gyn. scand.*, 1954, 33, supp. 3.

PELVIC insufficiency is characterized by two cardinal features: (1) it appears during pregnancy and parturition and is thus ascribable to factors then active, and (2) it is regularly accompanied by pain and tenderness of the pelvic joints. It varies significantly from one woman to the other and thus no limit can be placed beyond which one would be classed as having pelvic insufficiency. On the basis of clinical observation the condition is, on the whole, ascribable to both hormonal and mechanical factors. The author found tetany, acroparesthesia, cramps, meralgia paresthetica, and osteitis condensans ilii common accompaniments of the condition. He had 142 cases. Sixty-six consisted of pelvic insufficiency during pregnancy and 76 of pelvic insufficiency after parturition. It was noted that there was a great tendency toward recurrence. The symptoms were worse in the winter months. One year was considered the upper limit for the acute stage. Therapy was of two types, orthopedic (corset) and medication (vitamin D and calcium).

A chapter was devoted to each of the symptoms associated with the condition in which the frequency of the symptom was noted in the nonpregnant individual and compared with that in the pregnant and parturient woman. A number of tables, graphs, and roentgenographs of this condition are shown.

—James F. Donnelly, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Hormone-Producing Tumors of the Adrenal Cortex; a Review with Report of 2 Cases. DONALD T. HALL. *Am. J. Surg.*, 1954, 88: 162.

THE AUTHOR presents an excellent review of the embryology and physiology of the adrenal cortex. The cortical hormones are classified in four groups, according to function:

1. Hormones affecting salt and water metabolism. Desoxycorticosterone causes sodium chloride and water retention, and increase in potassium and phosphorus excretion. Unfortunately, there is no good assay method generally available.

2. Hormones affecting carbohydrate and protein metabolism. Primarily the "11-dehydro-17-hydrocorticosterones" produce symptoms like those of diabetes mellitus.

3. Hormones producing androgenic effects. Overproduction produces masculinization of the female. In the male there is little change.

4. Hormones producing estrogenic and progestational effects. These produce feminization in the male.

Clinically, most of the symptoms are due to combinations of these factors. The modern knowledge of use of these hormones has made possible proper preoperative and postoperative therapy.

The author plays down the part played by x-rays in diagnosing these tumors. He states that surgical exposure of the adrenal gland is more satisfactory and safer. (Some authors disagree with this evaluation.)

The author then presents 2 cases of adrenocortical tumors in which operation produced good results.

—John R. Herman, M.D.

Adrenalectomy for Prostatic Carcinoma. PAUL R. LEBERMAN, MORTON BOGASH, JOSE FIGUEROA-COLON, and JOHN E. BOWERS. *J. Urol.*, Balt., 1954, 72: 105.

BILATERAL adrenalectomy was performed on 6 patients with active disseminated prostatic carcinoma; 5 of these had previously been castrated and had received estrogenic therapy. The objective criteria employed to measure the course of the disease included body weight, hemoglobin, acid and alkaline phosphatase, and the size of either the primary or metastatic lesions, or both.

One patient died 90 days after operation. At the time the article was written the remaining patients had been alive 356, 342, 200, 82, and 67 days, respectively, after operation. Excellent subjective improvement was noted by 4 patients and objective improvement was observed in 3 patients. Unfortunately, the improvement was temporary. Two patients were not benefited.

The authors were of the opinion that favorable response after adrenalectomy was the result of further elimination of androgenic substances. They stated that total adrenalectomy for prostatic carcinoma remains an experimental procedure.

—Laurence F. Greene, M.D.

Essential Renal Hematuria. H. EDWARD MACMAHON and ROCCO LATORRACA. *J. Urol.*, Balt., 1954, 71: 667.

THE finding of a direct communication between a dilated venous sinus and a calyx in 3 kidneys removed because of bleeding from an undetermined site forms the basis of this report. In each case the site of communication was in the region of the fornix. In no case was there any evidence of severe or chronic inflammation.

The authors point out that large, thin-walled veins lie in close contact with the calyces in the kidney. The well known phenomenon of "pyelovenous backflow" in retrograde pyelography suggests the ready access between the calyx and the vein. The development of a communication between the veins and the calyx is therefore not surprising.

The authors urge the consideration of this mechanism of bleeding in cases of renal hematuria in which the nature of the lesion is obscure.

—John T. Grayhack, M.D.

Pyelographic Changes in Necrotizing Renal Papillitis. BITHEL WALL. *J. Urol.*, Balt., 1954, 72: 1.

NECROTIZING papillitis is a disease entity widely considered in the past few years. The pyelographic changes in this disease have not been frequently described. (Pyelographic studies of 8 cases have been previously reported.)

The changes in the pyelograms are essentially those expected from destructive lesions of the renal papillae, and may be present to any degree. An enlargement of the renal outline is found in each of the 3 cases presented, and this is presumed to be due to parenchymal inflammatory reaction. The illustrations present a good picture of the changes found, but it is difficult to differentiate the pyelographic changes from those of renal tuberculosis.

The author presents the picture of renal x-ray changes in necrotizing papillitis in the hope that early diagnosis may be facilitated and more of the patients saved.

—John R. Herman, M.D.

A New Theory on the Formation of Renal Calculi. REGINALD J. CARR. *Brit. J. Urol.*, 1954, 26: 105.

THE AUTHOR presents a scholarly report of extensive studies of the renal medulla and concretions found there, and he presents a convincing theory of the formation of renal stones. He uses (1) operative radiography with a film directly behind an exposed kidney, with and without retrograde injections of contrast media into the pelvis, (2) x-ray study of specimens removed at partial nephrectomy and random autopsy material (these specimens were studied with x-ray examination of the whole kidney, thick slices, and then thin slices to enable him to locate concretions 0.5 mm. in diameter), (3) histological study of the shape, size, and location of concretions, once found by the x-ray survey, and (4) x-ray diffraction studies of the material found in these concretions.

The author finds that normal kidneys have small concretions, usually lined up along one of the interlobular vessels at the edge of the renal papilla. These do not appear to coalesce or tend to grow by accretion. They are located in the substance of a papilla, not in the fornix of a minor calyx. They are often in small cystic spaces lined with endothelium and usually can be found even when large intrapelvic calculi exist. He points out that these occur at the sites of the papillary lymphatics, and believes that these concretions originally develop in the lymphatic system which ordinarily transmits fluid from the papilla to the thoracic duct. In conditions in which the capacity is exceeded, such as in hyperparathyroidism, or in which obstruction has occurred following infection and fibrosis, these concretions are prone to occur. Once concretions are present, obstruction (either pre-existing or occurring as a result of the concretions) causes dilatation of that particular lymphatic channel so that either a cyst forms or communication with the renal pelvis occurs. He points out that "pyelolymphatic backflow" is frequently observed upon retrograde pyelography. If communication with the renal pelvis occurs, the stones will be bathed in urine, and one stone may start to enlarge by accretion or serve as the nucleus for the usual varieties of pelvic calculi. He also states that careful examination will frequently show a cluster of tiny stones around one fornix, close to but not a part of a larger pelvic calculus. Randall's plaques are probably groups of these tiny stones clustered together at the tip of one papilla.

The author presents a case in which a stone was found in the perineal lymphatics, and x-ray diffraction studies of this calculus showed it to be composed of the same crystalline structure as the usual intrapelvic calculi.

—*C. Barber Mueller, M.D.*

Obstruction of the Lower Third of the Ureter by Anomalous Blood Vessels. LAURENCE F. GREENE, JAMES T. PRIESTLEY, HOWARD B. SIMON, and RICHARD H. HEMPSTEAD. *J. Urol.*, Balt., 1954, 71: 544.

TWO INSTANCES of hydronephrosis and segmental hydroureter were found to be due to patent anomalous blood vessels which crossed the ureter midway between the bladder and the pelvic brim. The juxtavesical portion of the obstructed ureter was normal in each case. Division of the offending vessels relieved the obstruction. Both ureters were opened and explored but there was no additional pathology in either case.

Both of the patients were males, aged 24 and 47, respectively. Both complained of pain in the left flank. The obstruction in the lower third of the ureter was demonstrated by retrograde pyeloureterograms. Both patients had febrile episodes but the urine of only one was infected at the time of examination.

Both operations were performed through left inguinal incisions. One ureter was splinted with a 12F T tube. The patients have been followed for 1 and 2 years, respectively. Both are asymptomatic and the affected kidneys are now essentially normal.

Hyams is quoted as having reported a case of obstruction in the lower third of the ureter by a blood vessel and mentioning 4 similar cases.

—*Ormond S. Culp, M.D.*

Ureteral Regeneration; Experimental and Clinical. ROBERT G. WEAVER and JAY H. HENDERSON. *Tr. West. Sect. Am. Urol. Ass.*, 1954, 20: 95.

THE PURPOSE of this study was to determine the nature of repair of the ureter after an artificial defect has been produced. The authors sought to determine (1) whether the defect should be repaired over a ureteral splint, (2) the time necessary for such repair, and (3) the type or types of tissue which constitute the regenerated ureteral wall.

The ureters of 20 dogs were exposed and, starting at a point approximately 1 cm. below the kidney, the ureter was excised for a distance of 2 to 3 cm. except for a thin strip 2 to 3 mm. in width which contained all components of the ureteral wall. An 8 F. red rubber catheter was passed as a nephrostomy tube through the middle calyx and well down into the distal ureter beyond the excised area. The dogs were divided into groups and nephroureterectomy was performed on different groups 2, 3, 4, and 6 weeks after excision of the ureteral segment. Sections were obtained for histologic section from the ureter above the excised segment, at the site of excision, and below the site of excision. In addition to these cross sections, longitudinal sections, which included the normal ureter above and below the excised segment, were obtained.

Study of the excised area 2 weeks after excision disclosed regenerated mucosa, thinner than normal and markedly infiltrated with fibrin and inflammatory cells; evidence of muscularis was not noted. Three and 4 weeks after excision the reformed mucosa showed strands of muscularis invading the inflammatory area. All components of the ureteral wall were observed 6 weeks after excision. The muscle appeared thinner and did not have the mature appearance noted in the normal ureter both above and below the excised area. Permanent canalization was observed in all specimens.

On the basis of knowledge and experience obtained in the experimental laboratory, the authors treated 20 patients with ureteral strictures by partial excision of the ureter combined with ureteral splinting for 6 weeks, with uniformly good results.

—*Laurence F. Greene, M.D.*

The Clinical Use of the Terminal Ileum as a Substitute Ureter. WILLIAM C. BAUM. *J. Urol.*, Balt., 1954, 72: 16.

THE USE OF THE TERMINAL ILEUM as a substitute for a ureter with gaps in continuity which cannot be bridged by more conservative methods appears reasonable. This is a way to save kidney tissue which might otherwise be sacrificed.

The fear has always been present that the absorption of urinary constituents would make this procedure unsatisfactory for human use. However, recent workers have proved that the use of isolated segments of small bowel is feasible in animals without the danger of resorption.

The author presents 4 cases in which isolated segments of ileum were utilized to replace ureters. Mechanically, it seems a good procedure, although reflux at the ileoneocystostomy is routine. Chemically, there was no evidence of imbalance following this procedure and, therefore, there was no evidence of urinary absorption.

The author believes (and many agree) that this method is of considerable interest and is definitely worthy of further investigation. —*John R. Herman, M.D.*

BLADDER, URETHRA, AND PENIS

The Neurogenic Bladder. Considerations of Innervation, Pathophysiology, Etiology, and Therapy (Die nerval gestoerte Harnblase. Betrachtungen zur Innervation, Pathophysiologie, Aetiologie, und Therapie). F. J. GOETZEN and H. BOEMINGHAUS. *Zschr. Urol.*, 1954, 47: 129.

THE AUTHORS review the innervation and physiology of the bladder, but their statement that impulses for volitional micturition travel from the paracentral lobule "probably in the posterior columns—to the lumbar and sacral spinal centers, respectively," is hard to understand. They do not discuss specific bladder function (desire, initiation, and inhibition of micturition) in regard to the respective nerve pathways. The reciprocal detrusor-sphincter function is only mentioned; the authors believe that the active pull of the lateral detrusor fibers opens the vesical neck. Closure of the vesical outlet is thought to be myogenic rather than neurogenic.

Disturbances of micturition may be of traumatic or nontraumatic neurogenic etiology; the latter is either congenital or acquired, inflammatory or degenerative, and is confined to certain parts of the cord (tabes) or is diffuse (syringomyelia, hematomyelia, myelitis). If efferent pathways are involved, a hypertonic bladder results. Local malformation of the cord (spina bifida, meningocele) and intramedullary or extramedullary tumors cause disturbances according to their localization. Urologic techniques of examination are mentioned. In addition to the level and extent of the lesion, the bladder disturbance depends on the time elapsed after onset of disease or trauma. Automatic micturition (Goltz and Ewald, 1896 and Muller, 1902) can develop in cases with destruction of the sacral cord segments and depends on the intramural bladder ganglia. In contradistinction, lesions above these segments lead to a spinal reflex bladder.

Atonic urinary retention. The etiology of this condition is not clear; occasionally it can be traced to childhood, while in other cases the history discloses a rather recent loss of desire to urinate. A systemic nervous disease could not be found in many of these cases, but they are frequently associated with ureteral dilatation; an autonomic imbalance resulting in sympathetic inhibition is suggested as an explanation. The authors distinguish this condition of myogenic atony from the neurogenic atony which accompanies lesions of the afferent pathways (tabes, Friedreich's ataxia, combined degeneration of pernicious anemia). Myogenic atony, called myoneurogenic by American authors, is explained as detrusor fatigue resulting in decompensation associated with obstructive uropathy. The desire to urinate and pain perception from the bladder are then preserved, in contrast to the condition in tabes. Restoration of balanced function of the forces of expulsion and retention is the aim of therapy. Credé pressure is occasionally helpful. The bladder condition (including the sphincter) must be analyzed with the aid of a complete urologic examination and a decision should be reached whether the obstruction at the vesical neck is organic or functional. Presacral neurotomy and transurethral resection, with removal of only small amounts of tissue, are mentioned.

Another method of treatment is the operation of Rochet; this is described by Thevenot as follows:

A muscle strip from each rectus abdominis muscle, 10 to 12 cm. long, is attached to the side wall of the bladder. Boeminghaus explains the good results on the basis of a cystopexy effect; the bladder is better amenable to abdominal or Credé pressure. Boeminghaus has modified the procedure by fixing the extraperitonealized bladder high up on the abdominal wall by means of fascia rather than muscle. A successful operation requires that (1) the innervation of the abdominal wall be intact, and (2) that the forces of retention be easily overcome by straining or the Credé. Obstruction at the vesical neck may be removed by additional transurethral resection maneuver, presacral or pudendal neurotomy.

In myoneurogenic atony, resection of the bladder (vertex, anterior, and lateral walls) helps to restore function (Orr 1937). The rationale of the operation rests upon the intact innervation of the trigone. The authors consider this a more radical procedure than Rochat's operation and question its permanent curative effect.

Neurogenic urinary incontinence. Overflow incontinence occurs with combined detrusor and sphincter paralysis, and it becomes true incontinence when detrusor activity is resumed. One must never determine the course of treatment solely upon clinical manifestations without thorough examination. In cases with slight stress incontinence a penis clamp may be useful. The presence of detrusor atony should warn one against corrective plastic operations at the vesical neck, whether the retropubic fascia plasty of Millin or a gracilis muscle plasty. In cases with good detrusor function, Lowsley's bulbocavernous plication with fascia or ribbon gut may be considered. Suprapubic cystostomy with permanent occlusion of the vesical outlet by fascia and ureterointestinal anastomosis are mentioned. A competent rectal sphincter function is a prerequisite for the latter operation.

Tabetic bladder disturbances. This is either (1) pure neurogenic, or (2) combined with organic obstructive uropathy (prostatic hypertrophy). Characteristic is the loss of the desire to urinate with consequent overdistention of the bladder. Initially a phase of hyperirritability of both sphincter and detrusor may be present, and later complete detrusor atony with eventual paralysis of both detrusor and sphincter systems develops. Correction of organic obstruction by transurethral resection and bladder training helps in the treatment. Occasionally, pudendal nerve anesthesia or nerve section may be indicated.

Bladder disturbance with injuries of the spinal cord. There is some controversy whether after recent cord injuries there is genuine atony or whether atony results from hyperdistention. The following stages of bladder disturbances are distinguished: atonic bladder, overflow bladder, autonomous bladder, and spinal reflex bladder. Perception of bladder fullness in relation to the level and autonomic pathologic reflex mechanism are

mentioned; the latter are described as occurring with lesions above T-9 and T-10 and the authors base this statement on Head and Riddoch's observation rather than on their own experience. Auxiliary stimuli for reflex micturition are enumerated. Prather's "spontaneous neurogenic" bladder is mentioned in connection with incomplete lesions. Diagnostic methods including electromyographic examination are discussed. The difference of bladder function with lesions above and below T-11 is stressed. The postulates of Hutch and Bunts for a well-functioning bladder are quoted; namely, emptying interval 2 to 3 hours, with control during these periods and a residual not to exceed 100 c.c. An indwelling catheter facilitates bladder function as compared with other methods. The favorable level for early recovery is from C-7 to T-5. In apoplectic hemiplegics function returns more quickly because there is no intervening phase of spinal shock. Conus and cauda lesions are rarely accompanied by reflex micturition and, if so, only after a longer period of 8 to 20 months. If after 1.5 to 2 years no bladder function develops, it is unlikely ever to return.

The various phases of bladder recuperation are discussed. The lack of attention paid to cord bladders in Germany is regretted by the authors; complications are enumerated. Mortality figures of World War I and II are compared as presented in the Anglo-American literature and the rehabilitation efforts are described.

The treatment during the atonic phase is discussed in detail and the advantages and disadvantages of the following respective methods are weighed: intermittent catheterization, indwelling catheter, suprapubic cystostomy, tidal drainage with manual or automatic control, and the method of "nonintervention." None of these methods prevents infection although this is less common with "nonintervention." Complications such as urethritis, prostatitis, epididymitis, orchitis, periurethral abscess, and penoscrotal fistula, are discussed. The authors use a No. 18 or No. 20 two-way Foley catheter, and as irrigating fluid, saline solution, boric acid, chinosol (0.1%), and G-solution.

Parasympathicolytic agents such as atropine or banthine, and tetraethylammonium chloride to block the ganglia have their place in therapy. The favorable effects of prostigmine reported by Andrulakalis could not be confirmed by the authors.

Among the operative measures, presacral neurotomy is of little value in cord bladder disturbance. It is indicated only in cases with an intact lumbar cord in which the conus and/or cauda are destroyed (spina bifida and hematomyelia). Transurethral resection is not only mechanically efficacious, but may restore the neurogenic equilibrium between forces of expulsion and retention by interrupting inhibitory impulses through local destruction of nervous structures. Pudendal nerve anesthesia and division are discussed in respect to indications and techniques. Subarachnoid injection for treatment of spasticity and its technique and its effect on bladder function is mentioned. The indication for and technique of rhizotomy and sacral neurotomy with preceding sacral nerve anesthesia are discussed. The accuracy of selective anesthetic blocks of individual sacral nerves is doubted. An interesting exposure of the sacral nerves through a presacral approach, as described by Thiermann, is reported.

Eventually prophylactic measures are enumerated for the prevention of calculus formation; the upright position, hypercalcemia and hypercalciuria, muscle exercises, G-solution, reduction of infection are considered. Boshamer's recommendation to perform preventive splanchnicectomies in patients with lesions between T-9 and L-2, and who show an allegedly frequent incidence of calculosis is reported. Hyaluronidase is also mentioned as a prophylactic measure. A plea is made for specialized services to afford adequate medical and nursing care for patients with cord injuries, as is done in England and the United States.

—Ernest Bors, M.D.

The Substitute Bladder; a Report of 5 Cases. GRAHAM GODFREY. *Austral. N. Zealand J. Surg.*, 1954, 23: 161.

THE AUTHOR reported 5 cases of bladder substitution by the method described previously by two American surgeons. He considered that this operation, either alone or in combination with pelvic exenteration, is a valuable palliative measure in the treatment of certain cases of advanced cancer of the uterus. The technique is as follows:

After mobilization of the right colon and appendectomy, the colon is divided at the hepatic flexure and both ends are closed. The ileum is cut across approximately 5 to 6 inches from the ileocecal valve and the proximal end, after closure, is brought up and anastomosed by the side-to-side method with the right extremity of the transverse colon. The isolated colonic segment is swung across in front of its blood supply so as to lie transversely at about the level of the fourth lumbar vertebra. An incision is made in the posterior parietal peritoneum at this level and the substitute bladder is partially embedded by means of interrupted sutures. The ileal stump which is to form the new "urethra" is brought directly through the abdominal wall via a small stab wound approximately 2 inches to the right of, and 1 inch above, the umbilicus. No attempt is made to obliterate the lateral gutter since it is believed to be important that the new "urethra" should be straight and under no tension.

In these cases, with little variation, the average capacity of the substitute bladder is about 360 c.c., and this has given continence with emptying at intervals of approximately 3 hours. The patients seem to find no difficulty in passing catheters.

It has been noted during endoscopy that at a certain degree of distention the substitute bladder actively contracts and causes partial evacuation of its contents. Similarly, when the substitute bladder is allowed to overdistend, leakage is intermittent and sometimes quite forcible. It would seem also that the same reflex may be elicited by manipulation of the catheter. The patients soon learn this trick and make more use of it than of simple abdominal pressure.

Preliminary irradiation of the colonic segment has resulted in a striking diminution in mucus secretion and this has been of very great benefit both at the time of operation and subsequently. After 2 or 3 months there has been a slight increase of mucus production.

At no stage in any of these cases has there been any evidence, either clinical or biochemical, of hyperchloremic acidosis. *—Robert Turell, M.D.*

GENITAL ORGANS

Histologic Diagnosis of Cancer by Study of Blended Tissues, with Particular Reference to Adenocarcinoma of Prostate. TED E. LUDDEN and ROBERT E. JENSEN. *J. Urol.*, Balt., 1954, 72: 57.

A METHOD for the early diagnosis of cancer of the prostate gland has long been sought. The authors present a method for examining tissue removed by transurethral resection which has proved practical as a means of finding small amounts of carcinomatous tissue.

The blending of formalin-fixed tissues in a Waring blender serves to spread a small, isolated malignancy extensively through the tissues, so that when the blended tissues are blocked and sectioned, there should be little chance of missing the lesion.

This method was then checked experimentally by adding one part of carcinoma-bearing prostate gland to one hundred parts of benign prostate in 20 different mixtures, and blending and sectioning these mixtures.

In 16 of the 20 preparations, malignant tissue was recovered, and not only were the cytologic findings good, but histologic detail was satisfactory for diagnosis.

Clinically, 114 prostates histologically diagnosed as prostatic hypertrophy were studied. In 5 of the preparations suspicious lesions were found, and in 1 case definite carcinoma was found.

This method is a promising one for finding small malignancies. It may well develop into a valuable adjunct for the diagnosis of prostatic lesions.

—John R. Herman, M.D.

Some Observations on the Cryptorchid Testis. JOHN N. ROBINSON and EARL T. ENGLE. *J. Urol.*, Balt., 1954, 71: 726.

THE histologic structure of the normal testis for the age groups of 0 to 6 years, 5 to 10 years, 11 to 15 years, and 15 years or older was evaluated. The histologic development of cryptorchid testes in children of various ages was studied and biopsy specimens were compared with the normal testes. In children under 5 years there was little difference between the normal and the cryptorchid testes. However, beyond this age the cryptorchid testes showed evidence of growth, but their chronological age almost always exceeded their developmental age. A similar conclusion was reached when biopsies of normal and cryptorchid testes in the same child were compared. In general, there was little difference in the appearance of the normal and cryptorchid testes only when the patient was 5 years of age or less. Evidence that this apparent abnormality in the cryptorchid testis is not corrected by late orchiopexy was obtained by the finding that of 20 testes which were brought into the scrotum at the average age of 10, and from which biopsy specimens were taken at an average of 9 years later, only 1 was normal on examination.

From these facts, the authors suggest that the treatment of cryptorchid testes should be undertaken before the age of 5 years. They suggest that a course of 4,000 to 5,000 units of chorionic gonadotropin be given daily for 3 days. If this produces no change in a week, surgical procedures should be carried out. It is stated categorically that the testis should not be left in the abdomen.

—John T. Grayhack, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Osseous Lesions Secondary to Infected Missile Wounds; Observations in Treatment with Antibiotics. JOSEPH W. BATCH and FRANCIS H. HUGHES, JR. *U. S. Armed Forces M. J.*, 1954, 5: 469.

BARRING devitalized and necrotic tissue, an infected wound may be considered surgically clean and closed secondarily. After excision of infected areas the skin is coapted and closed. In the presence of necrotic tissue plus infection, débridement with asepsis of the wound is paramount before closure.

The authors report 500 cases of osteitis following war casualties. The success of the therapy depended on effective saucerization and vigorous antibiotic treatment. Antibiotic sensitivity tests are recommended to enhance usefulness of the therapy and shorten convalescence. Proper concentration of one antibiotic, or a combination of penicillin, streptomycin, aureomycin, and trypsin, by and large, proved effective in controlling the osteitis. Sympathectomy proved a valuable adjunct in wounds with poor skin coverage. In the great majority of the wounds, multiple organisms were found. They consisted, in the order mentioned, of hemolytic micrococcus pyogenes var. aureus, pseudomonas aerogenosa, micrococcus pyogenes var. albus, escherichia coli, proteus species, aerobacter aerogenes, paracolon bacillus, and streptococcus faecalis.

Twenty-one cases in this large series were intensely studied bacteriologically. Some observations worthy of mention are:

1. Of 52 organisms isolated, 31 consistently showed no change in sensitivity and 21 showed sensitivity changes.

2. Some organisms sensitive to a certain antibiotic were later observed to be resistant to that antibiotic, but sensitive to another.

3. Some organisms previously reported resistant became sensitive to the same antibiotic later.

4. Clinical improvement was demonstrable when the antibiotic was doubled in resistant organisms.

The mechanism of altered sensitivities may be due to contamination, cross-contamination, and liberation of organisms from pockets within the wound, hence, introducing a new and more virulent bacterium requiring a different antibiotic. Moreover, the environmental phenomena surrounding an organism may alter its form of life and habits with consequent altered susceptibility to a given antibiotic.

All 21 wounds were healed at the end of 12 weeks. The results were good in 11, fair in 6, and poor in 4 cases, respectively. —*Samuel L. Governale, M.D.*

New Observations on the Mechanical Behavior of Lumbar Discs. CARL HIRSCH and ALF NACHEMSON. *Acta orthop. scand.*, 1954, 23: 254.

THE AUTHORS raise the question of what happens pathophysiologically to produce an acute or chronic lumbar pain. They state that no one has succeeded in getting a satisfactory answer to this question. These authors state that not only the discs can be made responsible, but also the intervertebral joints, perhaps the ligamentous apparatus, and possibly other mesenchymal tissues around the vertebral column, as well as the nerves. The authors have attempted to study in greater detail the reaction of different lumbar intervertebral discs to increasing mechanical strains.

Fresh lumbar spines taken from autopsy material were used in this study. Mechanical pressure was measured on a special apparatus, i.e., measuring certain changes of shape after a given period of pressure. The method of measuring has given valuable information about the elasticity of cartilage, bone, ligament, and so forth. This was called *static* registration, but did not afford an opportunity to study the effect of short periods of pressure, called *dynamic* registration. As the experimental work progressed, both static and dynamic measurements down to one-thousandths of a millimeter were possible.

The authors state that it was striking to note how small are the changes of form that arise in the discs with loads of up to 100 kgm., and how perfectly the disc appears to be constructed to carry loads. Furthermore, it is found that degenerated discs can be more easily compressed than healthy discs, and are more sensitive to an increasing load. The mechanical behavior of the disc differs according to how fast the stresses set in. If a disc is kept loaded, a certain amount of compression occurs until an equilibrium is reached. If a disc is subjected to a short momentary load, it starts to oscillate.

Diagrams are presented, which show the amount of compression as well as the lateral expansion that occurs after increasing loads up to 100 kgm. in both normal and degenerate lumbar discs. There was no difference in the bearing capacity, whether the arches were intact, or a hemilaminectomy or a total laminectomy was performed. This supports the idea that the discs themselves play by far the most important role in carrying loads. The disc has the power of adaptation to mechanical stresses. The smallest trauma can produce great stress in a low back if the force acts rapidly. The changes in shape in a disc are of such intensity and frequency that it is hardly believable that muscular reaction can stabilize and protect a back from these variations in form. They are entirely due to the biophysical construction of the disc material itself. —*Daniel H. Levinthal, M.D.*

Congenital Anomalies of the Lumbar Spine of Persons with Painless Backs. O. BISTRÖM. *Ann. chir. gyn. fenn.*, 1954, 43: 102.

THE AUTHOR reports on a series of 151 cases of degenerative alterations in the lumbar spine of persons with painless backs. He has again reviewed this same series for congenital anomalies. He found that spondylolis-

thesis of varying degree occurred in 9 per cent of these patients, and that complete spondylolisthesis occurred in 1 patient. Spondylolysis was observed simultaneously in 8 cases, and in the remaining 5 cases probably a pseudospondylolisthesis. Transitional vertebrae between the lumbar and sacral regions were very common. In about 10 per cent of the cases there was sacralization and in about 10 per cent, lumbarization. Asymmetric formation of a false joint between the transverse process of the transitional vertebra and the sacrum was observed in 10 cases, and caused scoliosis in 4 of these.

The author concludes that degenerative and congenital alterations of the low back occur frequently without giving rise to painful symptoms.

—*Daniel H. Levinthal, M.D.*

Calvé's Disease; Spinal Localization of Eosinophile Granuloma (La vertebra plana; localisation rachidienne du granulome éosinophilique). LOUIS POUYANNE. *Rev. chir. orthop.*, 1954, 40: 25.

THE AUTHOR presents the case of a girl 3 years old who was brought to the hospital with low back and right leg pain. The roentgenograms showed a partial destruction of the second lumbar vertebra. The patient also had two skull lesions. One of these lesions was biopsied and proved to be an eosinophile granuloma.

After 6 months, follow up films of the spine showed the vertebrae which were involved by the process to be further destroyed; they had the typical appearance of "Calvé's vertebra." The skull lesions appeared to be healed in the roentgenograms.

This observation points very strongly to the fact that Calvé's disease represents the evolution of an eosinophile granuloma of a vertebral body rather than a localized osteochondritis.

On reviewing the literature the author found 5 cases in which an eosinophile granuloma of the skull and a "Calvé's type" of vertebra were observed.

—*Fernando Aleu, M.D.*

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Treatment of Skeletal Giant Cell Tumor; Results in 18 Cases (Résultats du traitement des tumeurs a myéloplaxes du squelette; A propos de 18 cas). M. GUILLEMINET and R. FAYSSE. *Rev. chir. orthop.*, 1954, 40: 3.

UP TO the present time it has not been established if the giant cell tumor of bone is a benign neoplasm or if it has a tendency to become malignant.

The authors review 18 cases Seven of the patients had been followed for periods of from 5 to 15 years; 5 between 3 and 4 years; 2 for 2 years; and 3 for less than 2 years. One patient died in the postoperative period. Malignant degeneration was not observed in any of these cases during the period of observation.

The methods of treatment were as follows:

In 5 cases, only roentgen therapy was used. Two good results were obtained with 4,000 roentgens administered in two series, with a 15 month interval. In the other 3 cases, in which smaller doses were used, the tumor recurred and further surgery was advised.

Twelve patients were treated surgically by curettage and by filling the defect with cancellous bone chips. In 7 of these the result was good. In 4 cases the treatment failed; in 2 of these a resection of the involved area was necessary and in the other 2, further roentgen therapy was instituted. The short term results in the 2 patients treated by irradiation after surgical treatment are good. —*Fernando Aleu, M.D.*

Transplantation of Joints to Replace Diseased or Damaged Articulations in the Hands. WALTER C. GRAHAM. *Am. J. Surg.*, 1954, 88: 136.

A CASE REPORT is presented demonstrating successful whole joint transplantation to replace the metacarpal phalangeal joint of the thumb.

The patient, a 3 year old boy, sustained a wringer injury of the hand causing necrosis of the soft tissues and bone of the thumb. Débridement was followed by the use of a split-thickness graft and later a partially tubed abdominal flap with wire tension to preserve length. Eleven months later the metatarsal phalangeal joint of the fourth toe was transplanted to the thumb. The transplant was maintained in proper position with a Kirschner wire. A considerable part of the joint capsule was removed but the collateral ligaments and a portion of synovia were left in place. Twenty months after the original injury the extensor pollicis brevis and the extensor pollicis longus tendons were replaced with a graft to restore motion. The transplanted epiphysis continued to grow and good function was secured.

It is the author's belief that many fingers could be rehabilitated by keeping in mind the possibilities of half or whole joint transplants to restore motion.

—*Donald C. Geist, M.D.*

Reconstruction of a Hand, with Transposition of a Finger. PETER GABARRO. *Plastic & Reconstr. Surg.*, 1954, 13: 462.

THE CASE REPORTED presents many unusual features which make it of interest from the technical point of view. A 31 year old male sustained mortar shell wounds of both hands, resulting in loss of the left index and middle fingers, including their metacarpal bones, and leaving the left hand badly mutilated but useful. Because of the condition of the left hand, the attempt at improvement of the right hand was more essential. The right hand showed the following features:

Little finger. Normal but functionless because of lack of any opposing thumb, and interference of the fixed ring finger.

Ring finger. Ankylosis of the interphalangeal joints with these phalanges contracted toward the palm; it is functionless.

Middle and index fingers. Both were amputated through the proximal phalanx, leaving less than half of these phalanges intact; their stumps are fused by scar tissue.

Thumb. Amputated through the proximal phalanx, and covered with good skin; the metacarpophalangeal joint is intact.

A series of operations is described and illustrated, the main features of which are the making of a new web between the index and middle finger in order to

free the index finger; and secondly, the transfer of the ankylosed two distal phalanges of the useless ring finger to the stump of the thumb. This was accomplished by first establishing a bridge of skin and subcutaneous tissue between the stump of the thumb and the ring finger; a "delay" operation was performed 5 weeks later, and the transfer was made 10 days after this. An interval of 2 months was allowed in order to establish good circulation, and then the grafted finger was arthrodesed to the stump of the thumb in the position of function. No attempt was made to re-establish nerve continuity.

The result of the operation was good and a useless hand was converted into one capable of opposing the new thumb to the rest of the fingers and of obtaining a good grip. —*Carl Schiller, M.D.*

My Present Attitude to Osteoarthritis of the Hip. BRYAN MCFARLAND. *J. Bone Surg.*, 1954, 36-A: 476.

OSTEOARTHRITIS of the hip is treated by (1) arthrodesis, (2) osteotomy, and (3) arthroplasty.

The indications for arthrodesis are: (1) when the disease is monoarticular in a young patient, (2) epiphysiolysis, (3) unilateral congenital subluxation, (4) Perthe's disease, (5) fracture dislocation, and (6) coxa magna.

Osteotomy is chiefly indicated in an older patient with a unilateral affliction. The procedure is well borne in patients with a short femoral neck and with marked adduction deformity. It should never be done in the presence of a long femoral neck and in abduction deformity. Osteotomy is best executed between the lesser and greater trochanter, in an oblique manner. As for the results achieved in the osteotomy (McMurray), the author states that he has performed this operation in approximately 200 cases, and an excellent result has been noted.

Arthroplasty is reserved for those patients in whom the opposite hip is in the process of degenerative stages or in jeopardy of painful ankylosing deformity. The operation of choice, as far as this author is concerned, is that of replacing the femoral head by a prosthesis of acrylic resin or the Judet operation. While the author does not discredit other time-honored prostheses, he has not used them.

His technique is that of a posterolateral approach to the hip. In closing, he sutures the tendon of the gluteus medius to the quadratus femoris and tendon of the gluteus maximus. Hence, he does not vitiate the strong adductor force of the thigh.

—*Samuel L. Governale, M.D.*

A New Type of Arthroplasty for Bony Ankylosis of the Hip. T. T. STAMM. *Guy's Hosp. Rep.*, Lond., 1954, 103: 1.

THE AUTHOR reports this as a new type of arthroplasty, but it has many similarities to existing arthroplasties. Basically, the head and neck of the femur are excised and the greater trochanter is placed in greater abduction. The greater trochanter is held at the shaft of the femur by an anterior angle plate. In fact, when the head of the femur is ankylosed in the acetabulum it is just the lower part of the head which is cut away, as well as the lower rim of the acetabulum. In arthroplasty, type I, the greater trochanter is excised and placed at right angles to the shaft and held in place with an anterior right-angled plate. By making the new acetabulum deeper, the upper surface of the acetabulum concave, and the upper surface of the replaced greater trochanter convex, quite a stable joint is formed.

A new arthroplasty, type II, is suggested, in which most of the head of the femur is left in the old acetabulum. The new acetabulum is formed, and only the upper tip of the greater trochanter with the attached muscles is attached to the lateral surface of the shaft of the femur. It is claimed that postoperatively these patients are ordinarily quite painless and able to obtain 90 degrees of flexion, or better, of the femur. This arthroplasty is basically for chronic arthritis of the hip. By this means, the abductor muscles are preserved. This is a preliminary report with no end result. —*Richard J. Bennett, Jr., M.D.*

Functional Results of Hip Arthroplasty with Acrylic Prosthesis. R. MERLE D'AUBIGNÉ and M. POSTEL. *J. Bone Surg.*, 1954, 36-A: 451.

DURING the last 5 years, the writers have operated upon 621 hips at the Clinique Chirurgicale Orthopédique et Réparatrice, of the Cochin Hospital, in Paris. These arthroplasties have been performed for: trauma (131 cases); osteoarthritis (264 cases); congenital subluxation (104 cases); congenital luxation (66 cases); rheumatoid arthritis (14 cases); spondylitis ankylosans (26 cases); and miscellaneous hip diseases (16 cases). Six deaths occurred in the series. Eleven patients were lost to the follow-up survey. The prosthesis used in the series was the original Judet first, and later a modified form with a steel re-enforcement.

From time to time the cases were assessed as to the efficacy of the method of treatment. Repeated re-evaluation elicited certain mechanical disadvantages such as fracture of the prosthesis, erosion of bone, etc., hence, new and more effective procedures were adopted.

The technique was as follows:

1. Gibson's posterolateral approach was used in all arthroplasties.

2. The normal length of the femoral neck was conserved whenever possible. When the femoral neck was short, the length was substituted by an appropriate cervicocapital prosthesis.

3. Due to some bony atrophy about the prosthesis in 15 to 20 per cent of the cases, the authors began to employ a cervicocapital prosthesis with a long intramedullary stem.

4. A "T" shaped incision is made on the capsule, and the tendons are resutured to their respective origin.

Postoperative results obtained at the end of 1 year in traumatic cases seen from 1948 to 1950 are graded as: very good in 17 per cent, good in 28 per cent, medium in 17 per cent, and poor in 38 per cent. In the second group, comprised of 86 cases from 1950 to 1952, the results were evaluated as very good in 20 per cent, good in 39 per cent, medium in 30 per cent, and poor in 11 per cent.

Some of the complications encountered in this large series of arthroplasties were fractures, dislocations, and infections. There were 3 deaths.

In the nontraumatic cases, the results were more encouraging. In the group operated upon from 1947 to 1950, 45 per cent had attained very good results at the end of 1 year; fair results were noted in 17 per cent and poor results in 38 per cent. On the other hand, the patients operated upon after 1950 showed still greater improvement. These results are tabulated as very good in 59 per cent and unsatisfactory in approximately 11 per cent.

Late results observed from 2 to 5 years postoperatively reveal 20 per cent functional loss of the hip operated upon. This loss of function is attributable to bone absorption around the Judet prosthesis with subsequent dislocation of the prosthesis.

The article is replete with many fine roentgenograms, statistical tables, and illustrated pertinent charts. —*Samuel L. Governale, M.D.*

FRACTURES AND DISLOCATIONS

Whiplash Fractures of Cervicodorsal Spinous Processes; Resemblance to Shoveler's Fracture. J. Gershon-Cohen, Earl Budin, and Frank Glauser. *J. Am. M. Ass.*, 1954, 154: 560.

Fractures of the spinous processes in the cervicothoracic area can occur when extension of the spinal column is attempted with the arms fixed. This type of avulsion fracture of the spinous processes has been termed "clay-shovelers' fracture." The authors report 38 cases in which multiple calcareous deposits or fragments were noted near the spinous processes of the cervicothoracic region. Since not a single shoveler appeared in the series, the authors conclude that this type of fracture can occur by means other than shoveling movements; namely, whiplash injuries of the cervical part of the spinal column.

Strong hyperflexion was carried out on 6 cadavers. In 2 of these a fracture of the sixth spinous process was produced, and in 1 a fracture of the seventh spinous process. In only 1 cadaver did fracture of the sixth spinous process occur under hyperextension. Treatment of the first mentioned 38 patients with injuries to the cervical part of the spinal column was symptomatic, with or without the use of a fixation device, and in only 7 of the 38 patients did union occur. Pain and limitation of motion are said to be seldom severe enough to warrant surgical excision of the loose fragments. —*E. W. Johnson, Jr., M.D.*

A Method of Repair of Symptomatic Chronic Acromioclavicular Dislocation. John S. Thiemeyer, Jr. *Ann. Surg.*, 1954, 140: 75.

The surgical procedure recommended for chronic acromioclavicular dislocation consists of a curved incision over the anterior border of the clavicle. The deltoid insertion on the clavicle as well as the ligaments of the acromioclavicular joint are exposed. These ligaments are removed in a single flap to expose the joint superiorly. The cartilage is removed, the joint is reduced, and two fine Kirschner wires are passed from the acromion to the clavicle to hold the reduction. The deltoid is dissected subperiosteally over the coracoid process to expose the coracoid process. A flap of the coracoid process is dissected from anterior to posterior margin, and a fixed base attached to the coracoid is left. This flap is sutured to the inferior surface of the clavicle with chromic sutures which pass through two small drill holes in the clavicle. The acromioclavicular joint capsule is plicated, the deltoid is reattached to the clavicle, and the wound is closed. The patient is placed in a Velpeau dressing for 6 weeks. The Kirschner wires are then removed and the arm is placed in a splint with progressive movements of the upper extremity.

Eight patients have been successfully operated upon by this procedure. Three cases are presented in this article. —*Richard J. Bennett, Jr., M.D.*

Fracture-Dislocations of the Shoulder Joint Treated by Excision of the Humeral Head and Insertion of an Acrylic Prosthesis. Mac Fellander. *Acta chir. scand.*, 1954, 107: 138.

The problem of treatment presented by fracture-dislocation of the shoulder joint or severe comminution of the upper part of the humerus is a difficult one. Closed reduction often either fails or produces neurovascular injuries if it is successful, and open reduction often produces necrosis of the head of the humerus, with or without ankylosis of the joint.

The author describes 4 cases in which treatment by excision of the dislocated humeral head with insertion of an acrylic prosthesis was successful. The ages of the patients ranged between 50 and 60 years, and at operation it was found that all had suffered considerable injury to the musculotendinous cuff and the subscapularis tendon, plus the fracture-dislocation of the humeral head. Eight to 18 months after the operation motion was adequate and pain minimal in all cases.

The author compares this method of treatment with excision of the humeral head in such cases, and believes that his results are far superior to those of excision of the head of the humerus. The Judet concentric prosthesis and Richard's prosthesis were used in these cases. —*E. W. Johnson, Jr., M.D.*

Medial Fractures of the Femoral Neck. To Nail or Not to Nail. Stein Sörlie. *Acta chir. scand.*, 1954, 107: 113.

The author reviews the follow-up results in 83 patients with medial fractures of the femoral neck. His patients were treated in accordance with the postulates suggested by Ivar Palmer, in order to avoid aseptic necrosis of the femoral head.

The fracture was reduced gently and the nail was introduced. The author relied on preoperative reduction by means of skeletal traction, and the average interval of time between the injury and nailing was approximately 24 days. Nailing was performed with the patient still in his hospital bed, as soon as adequate reduction of the fracture had been obtained. A cannulated Smith-Petersen nail was introduced very gently; impaction also was performed gently. The final postulate, namely, a long period without weight-bearing, was observed by the author in that weight-bearing was not allowed in any case in less than 6 months, and in 1 case weight-bearing was not permitted until 16 months after the fracture. Patients were usually not allowed out of bed in less than 30 days.

Approximately 90 per cent of the fractures healed; 10 per cent showed pseudarthrosis; in 10 per cent

aseptic necrosis developed. The average interval between injury and nailing in the group with pseudarthrosis was 81 days, and the author concludes that it is not well to wait too long to perform the nailing. The group in which aseptic necrosis developed averaged 18 days between injury and nailing, and the group in which healing was obtained averaged 24 days.

The author believes that the long period of freedom from weight-bearing is responsible for the low incidence of aseptic necrosis and that impaction of the fragments is of no value at all. He considers that nailing is the method of choice for the treatment of medial fractures of the femoral neck, and should be used in all instances if the patient seems able to withstand the procedure. —*Norman J. Rosenberg, M.D.*

Further Experiences with Osteosynthesis of Medial Fractures of the Femoral Neck with the Aid of 3 Nails (Multiple Nailing); with Special Reference to the Indications for Reconstructive Operations on the Hip Joint. GUNNAR NYSTRÖM. *Acta chir. scand.*, 1954, 107: 89.

THE AUTHOR reviews 120 cases of medial fractures of the femoral neck which were treated with three small flanged nails. All patients were followed for more than 2 years, and 100 were followed for more than 3 years. Only 6.7 per cent of fractures were of the valgus type. Healing was obtained in 94.2 per cent of cases. The incidence of aseptic necrosis was 25 per cent but of this group about one-half showed a good functional result, depending on whether or not arthrosis of the joint was a complication.

The sources of failure and the importance of regular roentgenographic controls during the first 3 years are emphasized. The value of "unloading" of the hip joint to counteract the development of deformity in cases of aseptic necrosis is discussed.

The author does not consider that an unsuccessful nailing or poor position of the nails justifies immediate use of a prosthesis, and states that even if our possibilities of predicting aseptic necrosis should improve, there is no reliable means of determining the functional result. He concludes that the indications for a primary prosthesis remain uncertain and depend largely on the ultimate efficacy of prostheses of the hip in general. He presents statistical data (from several large Swedish hospitals) which have appeared in the literature during the last 10 years and which, when combined with the author's series, represent 523 cases which have been followed. The rate of healing ranges from 83.6 to 94.2 per cent in these series and the rate of aseptic necrosis ranges from 11.5 to 45.1 per cent. —*Norman J. Rosenberg, M.D.*

Diaphysial Fractures of Both Bones of the Leg (Les fractures diaphysaires des deux os de la jambe; traitements et importance des séquelles). ET. DE DONCKER and ED. VAN DER ELST. *Acta orthop. belg.*, 1953, 19: 333.

THIS STUDY is based upon reports from insurance companies of the methods employed and the results obtained in 147 cases of fracture gathered from all the provinces of Belgium. In these cases the average period of time lost from work was 8.5 months and the average disability 11 per cent.

The three most important mechanisms in fractures of both bones of the leg are crushing between two unyielding surfaces (in this series, 39 cases), contusion or violent contact with a heavy object (36 cases), and torsion (19 cases). The types of fracture seen were transverse (83 cases), oblique, with high fracture of the fibula (15 cases); comminuted, with three large fragments (4 cases), and isolated fracture of the tibia (18 cases); 35 per cent were open fractures.

In the treatment of these patients the method most frequently used was immobilization in plaster (92 cases). Seventeen patients were treated by traction and plaster cast. The average loss of time in these groups was 8.5 and 9.35 months, respectively, and the average disability from 10.7 to 15 per cent.

Thirty-eight patients were treated by operative methods, 10 with an intramedullary nail, 8 with a bone plate, and the remainder by various methods—with screws, bolt, cerclage, Parham bands, and grafts. The average loss of time in these 38 cases was 12 months and the average disability 13 per cent.

The best results were obtained among a group of 17 patients treated with traction and plaster cast. The small number of cases in this group is explained by the fact that the majority of patients in the entire group were cared for at their homes because of the lack of hospital accommodations in provincial areas. The 17 cases obviously included the complicated cases which required hospital care. In the use of traction and plaster the authors stress the advantage of placing the traction nail above the malleoli if the level of the fracture permits, so as to spare the tibiotarsal articulation; care to prevent infection about the nail (daily alcoholization); traction of not more than 4 kgm., which can often be decreased after the first week; adequate countertraction; repeated roentgenographic control and reduction, under anesthesia if necessary, because after 3 weeks correction of the tibial axis is no longer possible; support of the foot in proper position; early and active movement of the foot and toes, and faradic stimulation of the quadriceps; and discontinuance of traction after 6 weeks.

Although surgical methods of treatment of these fractures seem simple and easy, the results are often unfortunate. The authors agree with Danis that the tibia is the bone which contributes most to discredit osteosynthesis. Among the complications reported following operation were circulatory disturbances, superficial necrosis of the covering tissues which appeared normal immediately after the accident (9 cases), suppuration (frequent after application of the bone plates) and pseudarthrosis. Late sequelae were edema, muscle atrophy, and joint stiffness. These result in part from failure to provide a suitable walking plaster cast at the proper time and inability to carry out well directed physical therapy. The authors conclude that the most satisfactory results will be obtained by skillful orthopedic care continued until complete consolidation has been obtained. The simplest treatment that provides a good result with minimum risk is advisable. If after 7 or 8 days the effort to obtain a correct axial alignment is unsuccessful, reduction under anesthesia should be attempted.

If the last is unsuccessful and there is no break in the covering tissues, open operation can be carried

out, but it must be followed by constant watchful supervision. The intramedullary nail is recommended for transverse fractures and screws for oblique fractures. If a splinter is present with a transverse fracture it can be fixed with a circular wire. Bone plates are not recommended.

Although the leg is fractured, the foot bears the brunt of the injury. Pain over the instep, stiffness at the ankle, and falling of the plantar arch are sequelae which must be watched for and counteracted.

—*Sumner L. Koch, M.D.*

Fracture Healing After Fixation with Standard Plates, Contact Splints, and Medullary Nails. An Experimental Study. FRED C. REYNOLDS and J. ALBERT KEY. *J. Bone Surg.*, 1954, 36-A: 577.

THE HEALING of fractures is preceded by creeping substitution or aseptic necrosis of the fracture ends. Circulatory integrity, impaction of fractured ends, and muscle pull augment the celerity of osteogenesis. Absence of these features delays or inhibits bony union. In order to prove their contention, the authors undertook an experimental study to evaluate the relative merits of the Eggers slotted plate, standard plates, and medullary nails. Forty adult dogs were selected and divided into two groups.

The first group comprised 19 dogs which were subjected to an osteotomy of both femurs; the fractures were reduced and a standard steel plate with 6 screws was inserted in one femur; a stainless steel Eggers plate with 6 screws was similarly applied to the other femur.

The second group comprised 21 dogs in which the left femurs were osteotomized and fixed with an Eggers plate; the right femurs were fractured and intramedullary nails inserted.

All operations were performed under strict asepsis. Not one of these animals received any external fixation to their femurs. Supervening infections developed in 10 of the animals, hence, only 30 were studied. At intervals of 7 days to 16 weeks the animals were sacrificed and histologic studies of the fracture areas were executed. The findings disclosed that in group I (standard plate), 11 femurs attained bony union and nonunion resulted in 6 femurs; in group I (Eggers plate), 12 attained bony union with nonunion in 5. In group II (Eggers plate), 11 achieved bony union, with failure in 10; in group II (medullary nail), 10 achieved bony union, with failure in 11. Interestingly enough, in Group I, infection developed in 4 femurs, with subsequent bony union. In group II, infection developed in 13 femurs, with subsequent bony union. Clinically, some femurs had achieved firm bony union prior to roentgenologic confirmation.

The present studies lead the authors to believe that use of the Eggers plate, which allows a to and fro motion of the fragments, tends to a greater incidence of bony union than the standard plates. The use of intramedullary nails also is conducive to bony union provided that the fixation is firm and the fractured ends are allowed to become impacted during and after the reduction. The continued telescoping mechanism of the fractured ends is a concomitant of bony union. —*Samuel L. Governale, M.D.*

ORTHOPEDICS IN GENERAL

Bone Salt Metabolism in Bone Growth and Bone Repair Studied in Rats by Means of Ca^{45}, P^{32}, and Na^{22}. GÖRAN C. H. BAUER. *Acta orthop. scand.*, 1954, 23: 247.

THE AUTHOR discusses the controversy in the literature dealing with the equilibrium of bony fluids, and the difficulties, therefore, in the use of radioactive isotopes to determine the amount of calcium and phosphorus being laid down in bone. He also discusses some of the differences of opinion and their fundamental importance in the interpretation of studies of bone salt metabolism. He quotes many references to previous publications of his own to support his premises.

The author discusses the use of radioactive calcium, radioactive phosphorus, and radioactive sodium in the study of bone salt metabolism, with many references to the work of previous authors, and concludes that the use of radioactive materials in the study of bone salt deposition is much easier and more accurate than earlier methods used. He suggests that the use of this modality will probably result in better understanding of the factors involved in normal bone growth, as well as of the processes involved in the healing of fractures. —*Morris Horwitz, M.D.*

Isoniazid in Treatment of Bone and Joint Tuberculosis; 20 Cases. D. Ll. GRIFFITHS, A. G. QUINLAN, and H. J. RICHARDS. *Brit. M. J.*, 1954, 1: 1355.

THE AUTHORS report the results of a pilot study undertaken to determine what might occur in the early evolution of bone and joint tuberculosis in patients receiving isoniazid.

Twenty "good" cases were selected, all with short histories of new and untreated tuberculous lesions of the bones and joints. The sites of the lesions were: the lumbar spine in 6, the hip in 5, a knee in 4, the dorsal spine in 3, the sacroiliac joint in 1, and the sternoclavicular joint and ankle in 1.

The patients were immobilized and the affected bones and joints were splinted. A full open-air regimen was established. No other antituberculosis drugs were given. No operations were performed apart from biopsy and aspirations of abscesses. All of the patients were given 5 mgm. of isoniazid per kilogram of body weight daily for 6 months.

The results were studied with respect to the effect on general health, the occurrence of abscesses, x-ray changes, and toxicity. While there was regular improvement noted in the general health with a gain in weight, the local tuberculous lesions fared no better and no worse than if no drug had been used. It was concluded that isoniazid alone is no magical cure for skeletal tuberculosis and that the more certain results to be expected from the use of streptomycin could no longer be denied this group of patients.

—*Kenneth E. Sherman, M.D.*

A Study of the Swelling of Operatively Removed Intervertebral Discs (Quellungsversuche mit operative entferntem Bandescheibengewebe). ANTON OTT. *Zschr. Orthop.*, 1954, 84: 577.

FROM 400 patients who were operated upon because of herniated intervertebral discs, 187 specimens were

taken for investigation. One hundred specimens were placed in isotonic salt solution, and 40 were placed in physiological salt solution to which hyaluronidase and hyaluronic acid were added. These specimens were left in the solution for about 3 days. The average age of the patients operated upon was 40.6 years. The specimens submerged in the isotonic solution increased in size about 114.17 per cent.

The author concludes, therefore, that the intervertebral discs are actually active within the spinal column. It is conceivable that at times the protrusion of the disc causes severe compression of the adjacent nerve root, which cannot be substantiated at operation because of the changing size of the prolapsed disc. Conservative treatment consisting of heat and infiltration may influence the size of the prolapsed disc and decrease the pressure on the nerve root. Hypertonic contrast solutions (50 per cent diodon and 70 per cent joduron) injected into the disc caused the disc to lose water and decrease in size.

The influence of the expanded intervertebral discs in the formation of scoliosis has been elaborated by Erlacher.

Specimens which were found to have expanded while being suspended in the isotonic salt solution failed to show any further expansion when put into distilled water. If they were placed in a solution to which hyaluronidase was added additional swelling of the disc tissue was observed.

The author concluded that the swelling of the intervertebral discs was caused by a disturbed hyaluronidase-hyaluronic acid balance. The quantitative determination of this balance in prolapsed and normal intervertebral discs could not be determined.

Histologic studies revealed that the fluid was taken up by the fibers and the interstitial tissues of the annulus fibrosus. The remnants of the chorda dorsalis, i.e., chordoid cells, and the interstitial tissue did not take part in the process of fluid absorption.

Other tissues were subjected to the same tests and failed to show any definite increase in size due to the absorption of fluid. Muscle, menisci, meniscus cysts, and ligamenta flava were used. The author concluded that inasmuch as the ligamenta flava failed to swell in these experiments they cannot be assumed to cause pressure on the nerve roots and thus be responsible for the disc syndrome.

The experiments further revealed that the age of the patient from which the prolapsed disc was removed had a definite influence upon the swelling of the disc tissue. The largest increase in size (350 per cent) was observed in a patient 30 years old. The duration of subjective complaints also had a definite influence upon the increase in size of the submerged specimen. No swelling was observed in patients in whom the process existed longer than 8 years. The greatest increase in size was observed in specimens from patients who had the disease only a few months.

The size of the prolapse had no influence upon the absorption of water. The appearance of the radiopaque shadow of the nucleograms was correlated with the ability of the surgically removed specimen to absorb water. The more extensive the degeneration demonstrated on the nucleogram the less was the ability of the specimen to absorb fluid postoperatively.

Compression of the expanded disc with a force of 15 kgm. (comparable with the compressive force when in situ) revealed that the tissue was difficult to compress and that it was compressed only one-tenth of its size. —*George I. Reiss, M.D.*

Biomechanical Problems of the Original Judet Prosthesis. JOHN T. SCALES and J. M. ZAREK. *Brit. M. J.*, 1954, p. 1007.

THE investigations of the authors suggested that both the design of the Judet prosthesis and the combination of materials used were unsatisfactory. In view of the number of breakages and instances of wear of the prosthesis manufactured in England, however, it was decided to investigate the reasons for these mechanical failures. The work has been made possible only by the generous co-operation of a number of orthopedic surgeons.

The mechanics of the hip joint have been examined, with special reference to the Judet prosthesis. The materials used in the manufacture of the prosthesis and its ultimate strength have been investigated under laboratory conditions. Fifty prostheses which were removed from patients either because of pain and/or mechanical failure were examined in conjunction with the clinical records of the patients who were concerned.

The disadvantages of the present design can be summarized as follows:

1. The stem is not strong enough. Flexural strength is diminished by fatigue; the acrylic is weakened by crazing, and the metal by stress corrosion. Unless the prosthesis is placed in a most favorable position, its load-carrying capacity will be exceeded.
2. The skirt is weak and vulnerable, and interferes with revascularization.
3. The head does not have sufficient surface hardness. The distribution of the forces acting upon the prosthesis have been examined.
4. The local blood supply is interfered with. The great trochanter should not be divided, for both mechanical and anatomical reasons.

The design and method of manufacture of all implants should be very carefully considered so as to avoid the great number of mechanically unsound features with which the original Judet prosthesis, as made in England, is overloaded. It is interesting to note that an improved design has recently been developed by Judet *et al.* (1954) in an endeavor to solve some of the problems. For example, the skirt of the prosthesis has been abandoned. The head has been set at an angle of 50 degrees to the shaft in order to retain more of the head and neck and so distribute the load to a greater area of bone.

The design of the prosthesis should be such that: (1) it is strong enough to transmit the forces due to body weight and the action of the gluteal muscles to the shaft of the femur without danger of mechanical failure, (2) it can distribute the load on the femur as uniformly as possible without endangering the blood supply and without producing local crushing of the bone, and (3) the dimensions of the head will provide the greatest loading area with the least limitation of movement of the femur.

—*C. Fred Goeringer, M.D.*

Metabolic and Pathologicoanatomic Investigations of the Musculature in Sudeck's Syndrome (Stoffwechsel und pathologisch-anatomische Untersuchungen der Muskulatur beim Sudeckschen Syndrom). E. SIEBER and F. MEISSNER. *Langenbecks Arch. und Deut. Zschr. Chir.*, 1954, 278: 123.

THE CHANGES in the bone, muscles, and skin observed in Sudeck's atrophy have been justifiably linked with the sympathetic nervous system. Stimuli emanating from a "center" cause changes in the vascularity and metabolism of the affected extremity.

In 9 cases the creatin-creatinine metabolism was investigated. Buerger asserted that the amount of creatinine excreted in the urine indicates the function of the musculature. The basal metabolic rate values of these patients remained within normal limits; however, the creatin and creatinine excretions in the urine increased. The author concluded that these findings indicated that the cause of the increased creatin-creatinine excretion lay within the muscles.

In cases of severe Sudeck's atrophy the oxygen consumption was found to be significantly reduced. In milder cases no changes were found. The author raises the question whether these tests would help to differentiate Sudeck's atrophies which will improve from those which will remain irreversible. The fate of the extremity is determined by the duration of the decreased vascularization.

Histological examinations of the muscles failed to reveal changes which could be interpreted as being characteristic for Sudeck's atrophy. In some sections dilatation of the arterioles as well as of the veins was found; in others, constriction of the arterioles and dilatation of the veins were observed. Edema was marked in most sections. The muscle fibers showed various signs of degeneration, vacuols, granular deposits within the sarcolemma, and loss of striations. Fibrosis was also observed.

Reproductions of histological sections were included in the original article.

—*George I. Reiss, M.D.*

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Aneurysms: General Considerations. GEZA DE TAKATS and CONRAD L. PIRANI. *Angiology*, 1954, 5: 173.

THE AUTHORS have written a rather extensive monograph on aneurysms and have summarized the present-day knowledge as to pathogenesis and treatment. They present a detailed discussion of the hemodynamics and histophysiology of the vascular system and its relation to the development of aneurysms. Special attention is called to the part played by the vasa vasorum and, to a lesser degree, the distribution of elastica, ground substance, and tensile strength of the adventitia in the pathogenesis of aneurysms. The clinical types, including congenital, traumatic, inflammatory, and degenerative forms, are presented and their treatment is discussed.

The authors believe that with the exception of congenital and traumatic forms of aneurysm, much can be done in the future to prevent the development of the infectious and degenerative types. The prevention of arteriosclerotic aneurysms is tied in with the general problem of arteriosclerosis, and considerable progress is being made in this direction. The medial degeneration leading to loss of elastica, myxomatous deposits, and rhexis of the vasa vasorum is a baffling condition which requires much basic study for its elucidation. Until these fundamental problems are solved, surgical removal of such weakened arterial segments and, if necessary, their replacement with autogenous or homologous grafts are the procedures of choice.

—*Harold L. Method, M.D.*

Tests for and Means of Improving the Collateral Circulation in Cases of Aneurysm and Arteriovenous Fistula of the Extremities. HARRIS B. SHUMACKER, JR. *Angiology*, 1954, 5: 167.

THE Matas hyperemia test remains the best and most practical method for evaluating the effectiveness of the collateral circulation before operation. A sphygmomanometer cuff in place of an Esmarch bandage is utilized to produce complete ischemia for a period of 5 minutes. If a good flush develops and extends to the distal end of the extremity within a period of 2 minutes after release of the cuff, the collateral circulation is believed to be adequate. Errors result from 3 causes: (1) when occlusion of the affected artery can only be performed with simultaneous occlusion of a nearby arterial stem, (2) inadvertent compression of collateral channels which are not involved and can be spared during surgical obliteration of the lesion, and (3) the rare case in which the aneurysm can be occluded without compression of an important collateral channel which is involved in the lesion and must be sacrificed at operation. These studies are based on the premise that no collateral vessels will be needlessly damaged during the operative procedure and postoperative thrombosis will not occur.

The most reliable test of collateral circulation at operation is observation of the color and warmth of the hand or foot during precise occlusion of the freely dissected affected artery. The collateral circulation is believed to be adequate if good color and warmth persist during obliteration over a 20 minute period.

Sympathetic denervation of the extremity, and frequent prolonged intermittent compression of the aneurysm or fistula are two useful but not infallible methods of hastening the development of collateral blood flow.

—*Allan D. Callow, M.D.*

Fundamental Principles Governing the Care of Traumatic Arteriovenous Aneurysms. EMILE HOLMAN. *Angiology*, 1954, 5: 145.

EXPERIENCE with arterial injuries in World War II and in the Korean War has demonstrated that continuity of an injured main artery must be restored if gangrene is to be avoided. The dangers of thrombosis, sepsis, and secondary hemorrhage accompanying immediate repair have been lessened with the availability of antibiotics, the development of special instruments and sutures, and the wide use of blood and plasma expanders. Other factors permitting more successful valvular surgery have been the increase in the number of young surgeons trained in the techniques of vascular surgery, the improvement in transportation of the wounded, and the development of methods of preserving vascular grafts. There has thus been a reduction in the rate of amputations, i.e., from 72 per cent to 21 per cent following ligation and immediate repair, respectively, of the popliteal artery and from 48 per cent to 10.3 per cent for all arteries.

In the Korean War arterial wounds were carefully débrided. Incomplete lacerations were formerly sutured but frequent thrombosis occurred. Damage to the arterial wall was suspected and later care included sacrifice of a centimeter of the vessel wall on each side of the injury with complete anastomosis. Heparin was used by some surgeons and not by others, without striking results. Sympathetic block was performed if a limb remained cool or was of poor color following arterial anastomosis. If the limb remained white and cadaveric, re-exploration of the wound for possible thrombosis was performed. After operation it was often necessary to maintain blood pressure at a normal or slightly higher level by repeated transfusions. Whenever a fracture of the extremity had been sustained at or beyond the site of arterial injury, amputation inevitably became necessary despite arterial repair. When too great a time lag occurred between injury and repair, restoration of arterial continuity could not revitalize a pregangrenous limb despite an excellently restored arterial flow. Important additional benefits from restoration of arterial continuity in place of the older therapy of ligation was elimination of the milder forms of vascular insufficiency such as uncomfortable cold limbs, claudication, and limitation of activity.

The important lesson to be learned from the hazards of an arteriovenous fistula is the need for early repair, preferably within 8 hours of wounding, with

the intent to restore arterial continuity. Restoration of continuity is desirable in fistulas of long duration, especially when the Henle-Coenen phenomenon is absent at the time of operation. In the Korean War such arteriovenous aneurysms as did escape early diagnosis were successfully treated in delayed operations by restoration of continuity, replacing the older operation of quadruple ligation and excision. The ideal approach to vessels in the neck is via transverse incisions. The subclavian artery is best approached by resection of the clavicle which need not be replaced. Longitudinal incisions crossing the inguinal and popliteal areas should be interrupted by transverse segments to avoid contractures.

—*Allan D. Callow, M.D.*

Renal Complications from Aortography. GERALD M. MILLER, EDWIN J. WYLIE, and FRANK HINMAN, JR., *Surgery*, 1954, 35: 885.

DAMAGE to the kidney from translumbar aortography has been observed in 7 of approximately 250 arteriograms taken during the past 2 years; this represents an incidence of almost 3 per cent. The renal damage was divided into 2 types:

1. Direct trauma (unilateral or bilateral)
   a. Misdirected needle
   b. Excessive pressure/volume
   c. Chemical irritation from radiopaque media
2. Indirect damage (bilateral? reflex)
   a. Drug toxicity/idiosyncracy (diodrast, iodine)
   b. Neurogenic factors

Three of the 7 patients afflicted fell in the first category, with renal damage resulting from direct trauma at the time of aortography. One patient developed an atrophied kidney on the side of injury; the second had a temporary nonfunctioning kidney with transient severe hypertension, and the third had only minimal evidence of injury at the time of injection.

The 4 cases of renal injury of the second type are equally well described. Two of the 4 patients had evidence of diodrast idiosyncracy. All developed reversible renal failure and recovered completely after periods of oliguria lasting from 10 to 11 days.

In order to test the significance of excessive pressure in the terms of renal damage, two types of experiments were performed on dogs. In one group, direct injection of the contrast media and India ink into the renal artery after surgical exposure of the vessel was carried out; in the second group diodrast and India ink were forcefully injected into the aorta occluded just below the renal arteries. In both experiments, following the injection of the material, the kidney was removed and perfused and a radiogram was taken. In both types of experiments there was evidence of subcapsular and interstitial extravasation; however, in the second group the extravasation was less prominent. Another experiment was performed to test the delayed effects of these injections. In this experiment the kidney was left in situ for 3 weeks and then removed. The microscopic examination demonstrated patchy areas of interstitial fibrosis.

On the basis of this clinical and experimental study, the following recommendations to insure against renal damage following aortography are suggested: (1) in order to fill the whole aortic tree, at least 50 c.c. of dye are necessary. The prevention of excessive pressure is assured by the use of two smaller 17 or 18 gauge needles for injection by hand, and (2) the direct injection into the renal vessels is prevented by injection of a small amount of dye and a roentgenogram is taken to delineate the position of the needle. The needle should be directed sharply upward so that it enters the aorta just below the diaphragm. For urologic purposes, 25 c.c. of dye material were found to be adequate. Even this small amount of dye may be injurious to the kidney if injected directly into the renal artery; consequently, the position of the needle should be determined prior to injection. Since the use of 70 per cent urokon has been instituted, the sudden movement of the patient away from the site of injection following the rapid injection of diodrast has been avoided.

—*Jerry A. Stirman, M.D.*

The Use of Hypothermia in the Prevention of Paraplegia Following Temporary Aortic Occlusion; Experimental Observations. ROBERT G. PONTIUS, H. LEROY BROCKMAN, ERIC G. HARDY, DENTON A. COOLEY, and MICHAEL E. DEBAKEY. *Surgery*, 1954, 36: 33.

ALTHOUGH RECENT DEVELOPMENTS in the surgical treatment of aortic disease by resection have provided a strikingly more favorable outlook for this grave condition, certain technical factors essential in the performance of the procedure have produced some limitations to the application of this form of therapy. This stems primarily from the fact that crossclamping of the aorta is necessary during the performance of excision of the diseased segment and its replacement by an aortic homograft. In cases in which the lesion is constrictive or obliterative, such as coarctation, this does not constitute a problem because of the fact that a well developed collateral circulation already exists. On the other hand, in patients with aneurysmal disease, this becomes a highly important problem, since crossclamping of the aorta under these circumstances creates potential ischemic hazards of temporary arrest of the circulation to the tissues distal to the point of occlusion. Accordingly, the degree of ischemic damage to organs below the level of aortic occlusion during this critical period usually determines the success or failure of the surgical procedure. The spinal cord distal to the site of aortic occlusion appears to be the most vulnerable tissue to damage from temporary ischemia. This presents the greatest problem in the thoracic aorta.

A number of experiments (with dogs) were undertaken to determine the effectiveness of hypothermia in preventing spinal cord damage following temporary arrest of the circulation in the thoracic aorta. Four groups of experiments were performed with a control series in each group and with a period of aortic occlusion of 1 hour in all of the animals. Although the aorta was occluded just distal to the left subclavian artery in all of the animals in each group, in certain groups additional measures were used to diminish the distal blood flow, such as interruption of the intercostal arteries and also the additional occlusion of the aorta at a lower level.

Whereas, there was only a slight reduction in overall mortality following the use of hypothermia in

these experiments, there was a striking reduction in the incidence of paraplegia. The over-all paraplegia rate for the surviving control animals was 65 per cent, but none of the surviving hypothermic animals developed paraplegia. On the basis of these experiments it is concluded that hypothermia has a definite protective influence against ischemic damage of the spinal cord following high aortic occlusion.

—LeRoy J. Kleinsasser, M. D.

Surgical Diseases of the Pulmonary Artery; Central Aneurysms, Arteriovenous Fistulas, and Peripheral Aneurysms. DAVID H. WATKINS and FRED. R. HARPER. *Am. Surgeon*, 1954, 20: 602.

ANEURYSMS of the pulmonary artery are exceedingly rare. Dilatation alone is not so rare and accompanies a host of congenital cardiac lesions and pulmonary disease. Aneurysm is seen as frequently in females as it is in males. This is in sharp contrast to aortic aneurysms of which the incidence is 5.6 in males to 1 in females. Eighty-five per cent of the cases involve the central branches of the pulmonary artery. Patent ductus arteriosus and patent interventricular septum are the most common associated congenital anomalies, and syphilis plays a part in approximately one-third of the cases. Heart failure is the usual cause of death.

These lesions appear on the roentgenogram as discrete rounded shadows at the pulmonary hilum. They must be excluded from aortic aneurysms and, more important, from patent ductus arteriosus.

Pulmonary arteriovenous fistulas arise on the basis of congenital malformations. Other developmental abnormalities are frequently present and the frequent combination with Osler's disease (hereditary familial telangectasia) is striking. The short circuiting of the circulation has as its consequence anoxemia of the peripheral blood with cyanosis, clubbing of the fingers, dyspnea, and polycythemia. Anemia due to hemorrhage from these lesions may obscure these peripheral signs. The lesions are most frequently peripheral in the lung and are often multiple. The similarity of the clinical picture to that of the cyanotic type of heart disease is apparent. The two may be differentiated by the normal size and function of the heart and the roentgenographic demonstration of the peripheral lesion. The usual roentgenograms are sufficient in the peripheral lesion, but angiocardiography may be necessary in lesions behind the heart or close to the mediastinum.

Surgical excision of the aneurysms is indicated. If they are multiple, excision may be attempted if no more than two lobes are involved. The danger of rupture is great so that operative removal of all symptomatic lesions is recommended and removal of asymptomatic lesions is debatable.

Acquired injury results in peripherally placed aneurysms of the pulmonary artery. They are exceedingly rare unless associated with tuberculous cavities when they occur with a sizeable incidence. Embolic spread with a mycotic embolus is the usual cause and the condition occurs in patients with ulcerative endocarditis. Patent ductus arteriosus was found in one-half of the cases. Rheumatic vascular injuries are another cause of this rare lesion. Trauma may occasionally cause a peripheral aneurysm.

Two cases of the central type of pulmonary aneurysm are reported. In 1 case wrapping with reactive cellophane did not alter the course, and in the other the aneurysm could not be mobilized because of its large size.

—Harold M. Unger, M.D.

Preservation of Arterial Grafts by Freeze-Drying; a Simplified Method. H. H. G. EASTCOTT, LEWIS B. HOLT, J. H. PEACOCK, and C. G. ROB. *Lancet*, Lond., 1954, 1: 1311.

THE AUTHORS describe a method of preserving arteries by freeze-drying. They have made certain experimental observations concerning the freezing, drying, reconstitution, and use of grafts. Tissue is usually dried for histologic purposes at −40 degrees C. or less. This is necessary if certain structural changes are to be avoided, but such drying takes much longer. Complicated apparatus is needed to maintain the refrigeration of the drying chamber and of the condenser during this long time, particularly if fairly large amounts of tissue are being dried.

One objection to drying with the chamber at room temperature is the possibility of changes due to eutectic separation of water and other constituents. Studies, however, of moisture removed from and remaining in arterial segments at various stages in the drying process show that as the drying temperature rises the water content rapidly falls, with the result that at −6 degrees C. about 87 per cent of the original water has already been removed. It is unlikely that the relatively small amount of water remaining will disturb the structure of the arterial segment, and the histologic appearance of the reconstituted artery confirms that by this standard the method has been satisfactory.

It is important to select donors of arterial grafts for freeze-drying with particular care. Even early evidence of intimal or medial changes preclude the use of this method, since lipoid material cannot be dried, and early changes in the tissue proteins may lead to further denaturation during drying. Stricter criteria are applied to the selection of donors when the vessels are freeze-dried than when they are banked frozen.

Many bacteria survive freezing and thawing, and some also resist prolonged desiccation. Freeze-drying is one of the accepted methods of preserving bacterial cultures. If the moisture content of a dried culture is very low, and storage is prolonged, there is a progressive loss of viable organisms; in fact, measures must be taken to protect them. The studies indicate that the freeze-drying of arterial grafts by this process is an effective means of reducing bacterial contamination. However, the grafts remain infected; therefore, the need for careful selection of donors and an aseptic graft-taking technique still remains.

—LeRoy J. Kleinsasser, M. D.

Preoperative Phlebography of the Lower Extremities (La phlébographie préopératoire du membre inférieur). R. VAN HOVE, BROMBART, and LAURENT. *Acta chir. belg.*, 1954, 53: 255.

THE TECHNIQUE of phlebography previously described by the authors not only allows visualization of incompetent perforating branches, but also a study of the morphology and function of the valves.

If phlebograms fail to demonstrate re-establishment of permeability of the deep veins after phlebitis, resection of the superficial veins is contraindicated.

Phlebograms are made with the patient in a sitting position. The method is not applicable for visualization of the veins of the pelvis or the hip, but as a rule phlebitis involves chiefly the femoral vein or its branches so that demonstration of the veins in a higher location is not necessary.

—*Joseph K. Narat, M.D.*

Varicose Veins; Comparison of the Stripping Operation with Other Methods of Treatment. J. F. Bolton Carter. *Lancet*, Lond., 1954, 1: 743.

A follow-up clinic was organized at the University College Hospital Medical School, in London, to study and compare results of various methods of treatment of varicose veins. The cases were divided into three groups according to the severity of the condition. Group I comprised uncomplicated varicose veins; group II, complicated varicose veins (ulceration, eczema, or superficial phlebitis, but without a history or evidence of deep venous thrombosis); group III, varicose veins secondary to deep venous thrombosis.

The methods of treatment consisted of one or a combination of the following procedures: injection alone; groin tie alone (interruption of the long saphenous vein and all its tributaries at the saphenofemoral junction); groin tie and injection; stripping and excision, which included interruption of the saphenous vein and all its tributaries at the saphenofemoral junction, stripping out of the saphenous veins with interruption of the communicating veins; short saphenous tie alone (interruption of the short saphenous vein in the popliteal fossa); lower tie or ties (interruption of superficial varicosities without interruption of the long saphenous vein); physiotherapy; grafting (in cases of ulceration in which healing was unduly slow).

Comparison of the various forms of treatment in groups I and II shows that stripping and excision has been the most effective method. Of 82 limbs with uncomplicated varicose veins treated by stripping and excision, 50 (61%) have remained free from any sign of recurrence for a follow-up period averaging 27 months, and these have not required a single postoperative injection; 175 limbs treated by stripping and excision presented no serious postoperative complications such as thrombosis, infarction, or sepsis.

In this series, the complications from the injection of sclerosants in the follow-up clinic have been more serious than the immediate postoperative complications. Three patients have suffered a popliteal thrombosis after an injection of 1 to 5 ml. of ethamoline oleate into varicosities in the back of the calf; in 1 patient an indolent ulcer developed after an extravenous injection of sclerosant; there have been 2 unpleasant instances of allergy. The results in all three groups confirm that injection treatment is disappointing and recanalization soon ensues.

Follow-up studies have shown that stripping and excision of varicose veins is a safe procedure, as 175 limbs have been treated in this way without serious morbidity.

—*Albert M. Schwartz, M.D.*

The Role of the Suprarenal Glands in Regulation of the Capillary Permeability (Role des surrénales dans la régulation de la perméabilité capillaire). B. N. Halpern, G. Biozzi, B. Benacerraf, and M. Briot. *Sem. hôp. Paris*, 1954, 30: 1545.

Vulnerability of an animal deprived of its suprarenal glands is demonstrated by circulatory collapse in response to an aggression. Traumatic or toxic shock in such instances leads to disturbances of the capillary permeability, hemoconcentration, escape of proteins from the blood, and reduction of the blood volume.

It has been shown that cortisone in combination with epinephrine re-establishes normal resistance in suprarenalectomized animals and that synergism exists between both substances.

Under ether anesthesia bilateral suprarenalectomy was performed in one stage on rats and mice. Immediately following the operation 2 c.c. of physiologic saline solution were administered subcutaneously to the animals.

Under normal conditions Evans blue dye does not pass the walls of the capillaries. The authors determined the minimal dose of histamine which, injected intradermally, allows escape of the Evans blue dye, injected intravenously, from the capillaries. The animals were bled and sacrificed 10 minutes after the injection. The day preceding this procedure mice were given 1 mgm. of cortisone per 20 gm. of body weight, and rats 5 mgm. per 100 gm. of body weight. Five, 10, or 50 gamma of epinephrine per 100 gm. of body weight was given rats and 5 gammas of epinephrine per 20 gm. of body weight were given mice. The injections were administered to rats 3 days and to mice 2 days after suprarenalectomy.

The experiments showed that capillary permeability is markedly augmented after suprarenalectomy. A potent synergistic effect of cortisone on epinephrine could be demonstrated. Five gammas of epinephrine combined with cortisone had the same action as 50 gammas of epinephrine alone. Cortisone increased the vascular tonus and reduced the capillary permeability in suprarenalectomized animals by rendering the small blood vessels more responsive to vasopressor substances such as epinephrine.

—*Joseph K. Narat, M.D.*

BLOOD; TRANSFUSION

Symposium on Blood Transfusion (A la transfusion sanguine). P. Adant and Others. *Acta chir. belg.*, 1954, supp. 1.

The withdrawal of 500 c.c. of blood causes a loss of 300 mgm. of iron. This deficit cannot easily be replenished by proper alimentation if blood is taken at frequent intervals; therefore, routine administration of iron preparations to professional donors is advocated.

The danger of gas embolism following intra-arterial infusion is of more theoretical than practical importance. Local complications can be avoided by strict adherence to the technical rules. For the purpose of resuscitation this method is superior to intravenous transfusion.

Studies of plant agglutinins active against human erythrocytes have provided a wide field for the study of erythrocyte agglutinogen complexes. Certain plant

agglutinins may be of value for elucidation of the complex nature of the human blood group antigen A.

If the newborn is found to be of an ABO blood group other than that of the cross-matched blood, Rh negative blood of its own blood group should be provided. As a last resort, the cross-matched O Rh negative blood can be used.

A modification of the customary method of plasma volume estimation with Evans blue azodye is based on the clarification of plasma accomplished by fractional precipitation of plasma proteins with ammonium sulfate.

When serum frozen to −20 degrees C. is defrosted, several layers of liquid, stained to various degrees, can be observed. Electrophoretic studies show that the uppermost layer is richest in gamma globulins. The freezing method provides test serums with a high agglutinin titer, facilitates determination of the blood groups, permits concentration of bivalent antibodies by natural or artificial immunization, and furnishes solutions rich in hemolysins and complements.

The blood group tests, when used in conjunction with other criteria, have proved to be a useful tool for anthropologists. There is a direct gene-antigen relationship of a small number of genes which determines the blood group antigens. The mutation rate among the blood groups appears to be low.

It seems that the adrenocorticotropic hormone exerts a favorable antihemolytic effect on the evolution of hemolytic disease in the newborn caused by maternal isoimmunization. This effect is attributable to certain lytic substances originating in the tissues. These substances produce hemolysis of the blood corpuscles previously rendered fragile by immune antibodies.

Simple detection of the presence of anti-A and anti-B antibodies in the serum of a pregnant woman does not justify prediction of an obstetrical complication.

The purified blood substance A obtained with Goebel's method from peptone can be used for the production of diagnostic sera anti-A.

The distribution of the ABO blood group among 944 Rh-negative women immunized by Rh antigen has been shown to differ from that of the general population. The difference is due mainly to a decreased frequency of group O and an increased frequency of group A. Directly contrary changes were found in the husbands and children of these women. The incidence of serological incompatibility between the serum of the mother and the ABO red cell antigens of the infant or husband is considerably smaller than in the general population. —*Joseph K. Narat, M.D.*

Potentially Dangerous Group-O Blood. A Screening Test. James M. Gardner and Geoffrey H. Tovey. *Lancet*, Lond., 1954, 1: 1001.

Emergency transfusions of Group-O blood to Group A, B, or AB patients entail the danger of possible hemolytic reaction between transfused anti-A or anti-B antibodies exhibiting immune characteristics and the recipient's A or B red-cell antigens. Laboratory procedures designed to detect the presence of prohibitive concentrations of these factors in Group-O blood have frequently been elaborate or very cumbersome.

When experiments revealed that sera containing the strongest hemolysins would hemolyse Group A or B cells during the course of a routine check for anti-A or anti-B agglutinin, the authors concluded that extension of this simple test to include a check for hemolytic activity might provide a technique for detecting most Group-O blood containing significant concentrations of immune anti-A or anti-B antibodies.

Working with sera samples of 1,960 Group-O donors, 9.4 per cent were found to contain strong anti-A or anti-B hemolysins. Of the Group-O sera containing strong anti-A hemolysins, 10 per cent also contained immune anti-A agglutinins in a titre greater than 1:16. On the other hand, no immune agglutinins in this concentration were present in 772 Group-O sera lacking strong hemolysins.

The authors therefore suggest that this is a simple screening procedure which, without necessitating additional labor or material, might be used by blood banks to test the blood of Group-O donors for hemolysins or immune agglutinins (anti-A or anti-B) in high concentrations. —*Orville F. Grimes, M.D.*

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

The Use of Antibiotics in Surgery of the Aged. FRANK P. FOSTER and ALBERT B. COPELAND. *Surg. Clin. N. America*, 1954, 34: 609.

ELDERLY PERSONS who may require surgery are becoming more numerous and the indications for the antibiotics in this age group are the same as at any age. Certain antibiotics, specifically bacitracin, neomycin, polymyxin B, and occasionally streptomycin, may be contraindicated in the aged owing to decreased kidney function. These agents are indicated when the more common antibiotics have failed, as when hemolytic staphylococci become resistant to both penicillin and erythromycin.

Use of the more toxic antibiotics must not be too quickly abandoned when they appear to be effective in the presence of some renal irritation which may result from fever, infection, dehydration, or electrolyte imbalance.

Cultures and renal function studies done preoperatively and cultures at the time of operation, before and after a contaminated field is entered, increase the surgeon's ability to deal with serious postoperative infection.

The dangers of acquired sensitivity to certain antibiotics are discussed. —*Ely Elliott Lazarus, M.D.*

Postoperative Pulmonary Complications; Observations on Their Prevention by Means of Physiotherapy. LARS THOREN. *Acta. chir. scand.*, 1954, 107: 193.

THE frequency of pulmonary complications varies with different types of operations. Intra-abdominal operations, especially laparotomies on the upper abdomen, are more likely to be followed by pulmonary complications than operations on other parts of the body. The complications discussed are atelectasis, pneumonia, and pleurisy.

Atelectasis comprises 90 to 94 per cent of all postoperative pulmonary complications. It has been attributed to (1) postoperative altered pulmonary ventilation, (2) reduced ability to expel secretions from the bronchial tree, (3) changes in quality and quantity of the bronchial secretion, and (4) reduction in caliber of the bronchial tree.

To prevent atelectasis, operation should not be undertaken on patients with infection of the upper respiratory tract until 2 weeks after the infection has subsided. Postural drainage should be used, if an excess of bronchial secretion is present. Any tendency to the development of hypoxia during the anesthesia should be combated. The patient should be roused from the anesthesia as soon as possible, and the throat and trachea cleaned before the patient is returned to the ward. Early motion in bed should be encouraged. The patient should be out of bed as soon as possible. Routine dosing with narcotics should always be avoided.

The occurrence of postoperative bronchopneumonia cannot always be prevented by the administration of antibiotics before and after operation.

Pleurisy often occurs. It usually does not appear to be secondary to pulmonary involvement.

The postoperative progress of 343 patients operated upon for gallbladder conditions was studied. The cases were divided into three groups. Patients in group I received physiotherapy both before and after operation; those in group II received physiotherapy only after operation; those in group III, a control group, received no physiotherapy. During physiotherapy, stress was laid on training in diaphragm breathing. When possible, the patient practiced deep breathing while lying on the left and right sides. The exercises were continued for 4 postoperative days.

In group I, patients who had received preoperative and postoperative therapy, the rate of pulmonary changes was 12 per cent; in group 3, the control group, 41.9 per cent; in group 2, those who had received only postoperative therapy, 27.1 per cent.

From these findings it appears that physiotherapy is useful in the prevention of postoperative pulmonary complications. The maximum benefit of physiotherapy is obtained if the treatment is given both before and after operation. The treatment is given by a therapist, but its success depends on the co-operation of the staff, as they supervise and maintain the patient's own training in these respiratory exercises.

—*Samuel Kahn, M.D.*

Evaluation of the Cardiac Status of the Poor Risk Patient. DAVID I. RUTLEDGE. *Surg. Clin. N. America*, 1954, 34: 597.

ONE of the striking features of modern surgery is the increased age of the average patient coming to surgery. An evaluation of the patient for cardiovascular disease should be done, to prepare him better for the surgery if such disease is present.

The group with congenital heart disease is not large, and most of these patients are not poor operative risks. If the patient has an acute bacterial endocarditis the condition should be corrected with antibiotics if possible and a period of 2 to 3 months allowed to elapse after the blood stream has become sterile before operation is undertaken. Any evidence of left ventricular failure should be corrected.

A well compensated rheumatic heart is not a contraindication to surgery. When auricular fibrillation is present the condition should be under digitalis control. Patients who are decompensated should be treated first, and the operation deferred for a period of 3 to 6 weeks.

The thyrocardiac, who was formerly one of the great problems in surgery, responds so well to the various antithyroid drugs that at the present time his condition does not constitute a contraindication to surgery. When these patients are properly prepared the mortality is 2 per cent, compared to a rate of 10 per cent before the advent of these drugs. For

the past 3 years tracheotomy has been performed routinely at operation on all thyrocardiac patients, and no deaths have occurred.

Cardiac arrhythmias are treated with pronestyl or quinidine. When the danger of congestive heart failure exists, salt should be restricted, and mercurial diuretics and digitalis should be employed. The greatest hazard of all is myocardial infarction. While it cannot be prevented, certain precautions can be taken to lessen its occurrence. The correction of anemia, adequate use of blood, adequate use of oxygen, and the prevention of hypotension are of definite value in lessening the chance of its occurrence.

A brief résumé is given of the management of cardiac emergencies developing in the operating room, including the treatment of cardiac arrest.

—*Ely Elliott Lazarus, M.D.*

Cardiac Arrest. BRIAN BLADES. *J. Am. M. Ass.*, 1954, 154: 709.

ALTHOUGH recent medical literature contains many accounts of acute cardiac arrest occurring during induction of anesthesia or during the surgical procedure, it is imperative that the frequency of this tragedy also be publicized. Accumulative data from many clinics indicate that the incidence of cardiac arrest might be one in 5,000; however, from other clinics the incidence is between one in 10,000 and one in 20,000.

The common denominator of the syndrome is hypoxia. Hypoxia may come about as a result of the impaired ventilation from any one of innumerable causes, and secondly, failure to maintain the circulation.

The preoperative measures to prevent cardiac arrest should consist of evaluation preoperatively of the cardiac status of the patient. Since the easiest and surest way to produce cardiac arrest or ventricular fibrillation in the laboratory animal is a combination of hypoxia and epinephrine, it would appear that satisfactory preoperative medication and personal assurance might aid in the prevention of cardiac arrest. Although "considerable abuse has been directed at anesthesiologists in connection with the subject of cardiac arrest" it is also true that "equal and severe criticism must be leveled at the surgeon who 'toe-dances' about the operating theater demanding speed and a hurried induction of anesthesia so that he may get to the next case."

The postoperative prevention of cardiac arrest consists chiefly in the maintenance of an adequate airway, care in handling of the patient, and the assurance that the vital signs are stable prior to being removed from the operating theater. Overloading of the circulatory system with blood or intravenous fluids must be avoided.

The treatment of cardiac arrest cannot satisfactorily be carried out unless proper equipment and adequate knowledge of resuscitation are present. The necessary physical equipment consists of (1) machine for artificial respiration, a supply of oxygen, endotracheal tubes, and face masks; (2) basic surgical instruments for a thoracotomy; (3) necessary drugs—procaine, epinephrine, and calcium chloride, and syringes and needles in duplicate; and (4) an adequate defibrillator or electroshock apparatus capable of delivering a 60 cycle alternating current of 110 to 220 volts with 1 ampere or more of current flow.

The four major principles of treatment of cardiac arrest are:

1. Adequate oxygenation accomplished either by an anesthesia machine with an endotracheal tube or a tight-fitting face mask. Attempts to resuscitate the heart without adequate oxygenation are doomed to failure.

2. Cardiac compression should be started within 3 minutes after cardiac arrest if the outcome is to be successful. The heart must be compressed vigorously to maintain oxygenated blood flow to the brain and although different opinions have been expressed concerning the frequency of the number of strokes per minute, it would appear that as rapid compression as possible should be maintained.

3. The shotgun type of drug therapy in cardiac arrest is to be condemned. Procaine should be used only to decrease myocardial irritability; epinephrine should be used to increase the function of the flaccid, sluggish heart and calcium chloride should be used to increase the myocardial tone.

4. Defibrillation of the heart, if the heart is dilated and cyanotic; further compression is required to improve its circulation prior to the application of the defibrillator. It is futile to apply shock to such a heart which is cyanotic and deficient in blood.

Extensive teaching programs dealing with the prophylactic treatment of cardiac arrest will reduce its incidence. Furthermore, the relative infrequency of this complication should also be stressed so that patients will not refuse operation. Thorough knowledge of the physiologic basis for the development of cardiac arrest as well as for means of treatment is necessary prior to the institution of resuscitative measures.

—*Jerry A. Stirman, M.D.*

Pitfalls, Precautions, and Complications in Cardiac Resuscitation; Study of 1,200 Cases. HUGH E. STEPHENSON, JR., L. CORSAN REID, and J. WILLIAM HINTON. *Arch. Surg.*, 1954, 69: 37.

THE AUTHORS discuss cardiac arrest and its treatment, based on studies of reports of 1,200 cases sent to them. Several misconceptions, pitfalls, and complications of cardiac resuscitation are discussed.

With an absent palpable pulse and no blood pressure, the diagnosis should be established, but in most unsuccessful cases the chance for resuscitation is lost during the critical period between arrest and diagnosis. The time factor is the crux, and in 94 per cent of successful cases, the heart was massaged within the first 4 minutes. Only 6 per cent of the patients survived after a delay of over 4 minutes. Life may be lost while time is wasted in useless diagnostic procedures, useless administration of stimulants, or in obtaining consultation from others. The absence of bleeding in a wound may establish the diagnosis. The fear of an occasional mistaken diagnosis should not be a deterrent to opening the chest.

The person to attempt cardiac resuscitation is the person making the diagnosis, for it is with this person that the patient's chances of survival rest. Particular emphasis on cardiac resuscitation should be centered

on the intern—who most frequently will have the optimum chance to attempt resuscitation in those cases occurring outside the operating room. This occurs in 13 per cent of cases. Knowledge of resuscitation should not be limited to the thoracic or general surgeon.

The standard fourth left anterior interspace seems to provide the most adequate approach for manual massage of the heart. An incision made too far medially would cut the left internal mammary artery. Time should not be wasted in removing ribs or inserting rib spreaders. Too much speed and bold action, however, may lacerate the lung or even the heart. The subdiaphragmatic and transdiaphragmatic approaches through the abdomen do not provide the advantages that the intercostal incision does. Production of pneumothorax should not be a deterrent to this incision.

The commonest pitfall in the actual intermittent compression of the heart (termed "massage") lies in the inability of the operator to massage in a fashion that is adequate for oxygenation of the cerebral cortex. "Massage" actually implies a left ventricular compression of sufficient intensity to allow a palpable pulse in the peripheral vessels, maintain adequate appearing coloration of the skin, and keep the pupils constricted. These criteria are more easily met if a relatively rapid rate is maintained, i.e., 60 to 85 strokes per minute. Compression with one hand around the heart is best for adequate massage, rather than other advocated methods such as the two-hand method, compression against the sternum, and use of suction cups.

Massage should be continued as long as one is convinced that artificial cerebral circulation has been adequate to prevent irreversible damage to cortical cells. The authors mention successful cases of recovery after 2 and even 8 hours of manual cardiac massage.

The pericardium need not be opened in every case; it lengthens the time of the incision, increases chances for technical difficulties, increases trauma to the heart from massage, and predisposes to complications from closure of the pericardium. The pericardium is opened in cases of thickening and for the application of electrodes in ventricular fibrillation.

Rupture of the myocardium during manual massage occurs not infrequently. Its occurrence almost always adds disaster to an already serious catastrophe. This is usually due to prolonged, localized, and excessive pressure on the myocardium by the thumb. In most reported cases, this occurred when the pericardium had been opened. With the intact pericardium, massage is less traumatic. Treatment is seldom successful.

The usual case of cardiac arrest requires the rapid administration of whole blood, and the intra-arterial route is the most effective. This can be done directly into the aorta, the femoral artery, or a peripheral artery.

Wound closure is the same as in any thoracic incision, with provision for underwater drainage and the intrapleural administration of antibiotics. There has been a striking absence of infection following thoracotomy for cardiac massage even when the operator is unable to use sterile precautions. It is important therefore that considerations relative to a possible infection be disregarded if they are to contribute to any initial delay.

Attention to artificial respiration and oxygen is of course vital, and should not be neglected.

Among the entire group of cases, 12 per cent were associated with fibrillation. A permanent survival rate of all cases of cardiac arrest was 28 per cent, and for all those in fibrillation, the rate was 29 per cent. Failure in achieving success in ventricular fibrillation results from (1) lack of electrical cardiac defibrillation; (2) failure to recognize defibrillation when present; (3) lack of experience with the technique of defibrillation. The authors recommend applying the metal electrodes directly against the heart, after the pericardium has been opened. Makeshift defibrillators can cause serious results.

Most cases of cardiac arrest do not require intracardiac injection of drugs. The injudicious use of various recommended drugs may cause great harm. The authors report success with 2 per cent barium chloride for increasing the tone of the myocardium. Preliminary injection of epinepherine into the heart through the anterior chest wall is considered a waste of time.

The authors recommend that emergency equipment for cardiac arrest be instantly available, which consists of a knife, some means of artificial respiration, and a portable defibrillating unit in all operating rooms.

In the postoperative period, nasal oxygen is recommended and tracheal suction should be available. Antibiotics should be continued for 5 or 6 days and hyperthermia should be combated with alcohol rubs and ice bags. The general condition of the patient should be followed with hemoglobin determinations, blood volume studies, x-rays of the chest, and frequent electrocardiograms. Digitalization is frequently indicated. —*Donald M. Clough, M.D.*

ANTISEPTIC SURGERY;

The Hematologic Response to Wounding and to Resuscitation Accomplished by Large Transfusions of Stored Blood; a Study of Battle Casualties in Korea. WILLIAM H. CROSBY and JOHN M. HOWARD. *Blood*, N. Y., 1954, 9: 439.

THE present study was undertaken by the Surgical Research Team of the United States Army in order to evaluate present methods of blood transfusion as practiced at the forward hospitals in Korea. Thirty pints of blood, and even more, may be transfused into a seriously wounded man during the few hours required for his resuscitation and surgery. Most of this blood is collected in the United States and transported by air to Korea, and is from 10 to 20 days' old before it is used. It is discarded after a period of 21 days. All of the blood is from universal donors; i.e., it is group O, Rh positive, and is used without crossmatching, regardless of the blood group of the recipient.

The study was undertaken to determine what, if any, are the harmful effects of massive transfusions and to learn if the age of the blood and the difference in blood groups contribute any deleterious effects.

There was no clinical evidence of transfusion reactions. The hematologic response of these men to transfusion could not be separated from the effects of the wounds that necessitated the transfusion. The total

number of patients was 37. All were young, their ages ranging from 18 to 24 years, or an average of 20.5 years, and several races and nationalities were represented. None of the patients was burned. The transfusions varied in quantity from 2 pints to 42 pints; 18 of the patients were given 9 pints or more. No hemoglobinuric reactions occurred.

The technique of performing all determinations is given. Differential determination of agglutinations of the red cells was performed by the Ashby technique. It is pointed out that determinations of the plasma hemoglobin are probably about 30 per cent low. The plasma hemoglobin averaged 34 mgm. of hemoglobin per 100 ml. of plasma on 300 pints of bank blood. At 10 days, the average was about 25 mgm. per 100 ml.; at 20 days, it was about 50 mgm. The average postoperative plasma hemoglobin level was 18 mgm. in the 22 patients on whom this determination was made. With three exceptions, it had returned to normal within 12 hours after operation. Plasma hemoglobin was found to decrease at much higher rates in patients who were not in shock.

Leukocytes and platelets of blood preserved in ACD solution are nonviable; they disappear immediately from the circulation of the recipient. The transfusions given to some of the patients were large enough to virtually replace their own blood with blood that was, in effect, free of leukocytes and platelets. The leukocyte count was not seriously depressed by large transfusions. The average preoperative count was 24,000 per cu. mm.; the postoperative count was 15,000. The platelet level was generally unaffected by dilution or replacement of the patient's blood. In fact, the platelet counts usually increased. The average preoperative count was 450,000 per cu. mm., the average postoperative count, 510,000. This is apart from those patients who had a hemoclastic reaction. It is pointed out that the patients were conditioned by severe injuries several hours before transfusion.

Severely wounded patients consistently showed an abnormally low mean corpuscular volume for several days, except during the period immediately following transfusion. There was no evidence of fragmentation. The hemoglobin concentration of the whole blood did not change. Similar changes in red cell hemoglobin concentration have been described following the administration of ACTH and cortisone.

There were no instances of tetany developing on the basis of hypocalcemia from rapid transfusion of citrated blood.

The posttransfusion destruction of red cells due to nonviability was not great. It is believed that the loss of most nonviable cells occurs in the reticuloendothelial system without release of pigment to the plasma. The loss of these red cells, even in association with massive transfusions, did not appear to impose a burden on the excretory mechanism of the patients.

When group O, universal donor blood is transfused into a recipient of another blood group, the plasma carries with it antibodies that are specifically active against the red cells of the recipient. The anti-A and anti-B antibodies consist of warm agglutinins, cold agglutinins, hemolysins, incomplete antibodies, and perhaps other substances. It was found that the specific cold agglutinins against group A red cells persisted in the plasma of a few patients of group A and group AB. In most cases the isoagglutinins were rapidly removed from the recipient's plasma even when he had been given enough blood virtually to replace his own plasma. No case of persisting anti-B agglutinins was found in patients of groups B or AB. Mild hemolytic activity directed specifically against the recipient's A or B red cells was not uncommon after transfusions of universal donor blood or pooled plasma. The hemolytic activity of these antibodies did not produce any clinical reaction.

In addition to this specific hemolytic activity there was evidence in severely wounded men of nonspecific hemolysis that destroyed native and transfused red cells indiscriminately. Cell survival studies gave evidence of this moderate hemolysis during the period of 5 to 15 days after wounding. The more severely wounded often tended to become anemic during the early days of their convalescence. This was a true anemia, and not hemodilution. Patients who tended to become polycythemic were those with abdominal wounds. In these patients the plasma volume was measured and found to be contracted. It is suspected that plasma is lost into the wounded bowel or into the abdomen. Two patients who developed acute severe renal insufficiency became rapidly anemic at the time they began to evidence uremia. This latter anemia was precipitous in onset. A rule of thumb evolved, viz., "abdominal cases become polycythemic; amputees become anemic." This is apparently correlated with the mass of tissue destroyed and the influence of peritoneal contamination on the initial shock picture. The explanation of this nonspecific posttraumatic hemolysis is not understood.

In 15 patients, postoperative reticulocyte counts did not exceed 2 per cent. In from 5 to 10 days after operation reticulocytosis had developed where anemia was present, but the number of reticulocytes was not consistent with the degree of the anemia. During the first week or 10 days of convalescence, a severely wounded man may destroy his red cells at 3 to 5 times the normal rate. Normally, the adult human bone marrow can produce hemoglobin at 6 to 8 times the normal rate. The bone marrow of seriously wounded men did not compensate to this extent, and they became anemic when red cells were destroyed at only four times the normal rate. There was an impaired response to anemia.

Several hemoclastic reactions were observed. These consisted of an abrupt and profound fall of leukocytes and platelets associated with a sudden drop in blood pressure. During the subsequent several hours the counts gradually recovered. This reaction occurs in response to many types of injurious agents: foreign protein, peptone, incompatible blood transfusion, etc. The reaction was noted in men who had severe abdominal wounds with gross soiling of the peritoneum. It was suspected that the reaction may have been due to contamination of the blood stream via the lymphatics of the diaphragm. During the reaction in one man, a blood culture revealed the presence of six different organisms.

Fibrinolytic reactions have been less than 1 per cent among patients who received more than 10 pints of blood.

The use of universal donor blood permits the establishment of small but effective blood banks. The need for crossmatching is eliminated. The transfusion can be started immediately. There is an elimination of incompatible transfusion reactions that inevitably occurs where group-specific blood is used.

—*Robert D. Keagy, M.D.*

Mechanisms of Wound Healing; Comparison of Preliminary Local and Distant Incisions. EDWIN D. SAVLOV and J. ENGLEBERT DUNPHY. *N. England J. M.*, 1954, 250: 1062.

A SYSTEMIC healing-promoting factor was proposed by Sandblom as being responsible for the increased rate of healing that he found in wounds made after a given time at a distance from a primary wound. The greatest effect seemed to be present during the second week after wounding. This concept has been disputed by Taffel, Donovan, and Lapinski.

In an effort to evaluate this problem, 48 male Hisaw rats were studied. Left rectus abdominal incisional wounds were made 15 days after wounds on the back in rats and these did not show any greater tensile strength on the third day than 3 day abdominal wounds in a control group on which no previous wounding had been made.

A summation of such an effect could not be demonstrated by multiple wounding on the back before an abdominal wound. Fifteen day old abdominal wounds that were opened and resutured revealed a significant increase in tensile strength on the third day after resuture.

These findings are thus in accord with the work of Taffel *et al.*, who also could not demonstrate a favorable effect of one wound on another.

—*LeRoy J. Kleinsasser, M.D.*

Essential and Nonessential Amino Acids in the Urine of Severely Burned Patients. GEORGE L. NARDI. *J. Clin. Invest.*, 1954, 33: 847.

THE AUTHOR has analyzed the excretion of urinary amino acids in severely burned patients. His study was prompted by the report of undetermined nitrogen, the nature of which was not clearly understood, in the urine of these severely burned people.

Using a modified technique of Kjeldahl, the author found that the urine of normal people contained mainly glycine and alamine with occasional traces of other nonessential amino acids. In general only the lower molecular weight nonessential amino acids were found in the urine. In getting these normals, five persons of the laboratory personnel served as donors.

A phenomenon termed amino-aciduria was found to accompany severe thermal trauma. It was also present after major surgical procedures. It consisted of an increase in both the lower molecular weight nonessential amino acids normally found in urine, and the higher molecular weight essential amino acids not usually present. Those dying of their burns had a massive excretion of both essential and nonessential amino acids, whereas those who were not burned severely showed only a minimal amino acid excretion accompanied by a preponderance of nonessential amino acids.

The actual mechanism of this amino-aciduria is not clear, and there are three possibilities: (1) amino-aciduria may result when elevated blood amino acid levels exceed the renal threshold; (2) with normal blood levels, renal damage and failure of tubular reabsorption may cause amino-aciduria; (3) finally, amino-aciduria may be seen with normal blood levels and intact kidneys in certain metabolic disorders.

—*Matthew H. Evoy, M.D.*

Homologous Skin Graft Used as a Life-Saving Expedient to Promote Thrombosis of a Bleeding Wound in a Patient with Hemophilia. HERBERT CONWAY and RICHARD B. STARK. *Plastic & Reconstr. Surg.*, 1954, 13: 446.

HOMOLOGOUS transplantation of skin in the mouse is known to produce thrombosis in the recipient bed in an average of 5.6 days. This is the first report of the application of this principle to man whereby homografts of skin are used to produce multiple thromboses of a bleeding wound in a hematological crisis complicated by serious external bleeding.

A 23-year-old male with a known and proven history of hemophilia had had eighteen previous admissions for episodes of uncontrolled hemorrhage. On this occasion, he caught his forearm in a car door and developed an expanding hematoma in this region. Because of ischemia of the fingers, digital anesthesia, and impending gangrene, the forearm and antebrachial fascia was widely opened. The circulation returned, but blood continued to ooze from the wound requiring multiple transfusions and antihemophilic plasma; on the fourth day, 1,500 c.c. of blood were required in one 12 hour period. A thick split homograft was taken from the patient's father and applied with a bolus type of pressure dressing. The bleeding ceased and the graft healed well.

Four weeks following this procedure, the homograft showed signs of dissolution and soon after, the wound started to bleed again. On the fortieth day following homotransplantation, the homograft was removed and an autograft taken from the patient's thigh was applied to the forearm wound, despite an abnormally prolonged bleeding time. The necessary daring which prompted the cutting of an autogenous skin graft in such a patient was supported by Reznikoff's management of the hematological crisis. One hundred to 150 c.c. of freshly drawn whole blood were given every hour for 24 hours on the theory that the transfused blood would supply sufficient clotting mechanism to achieve primary healing of the donor site and adherence of the graft. After 48 hours, a hematoma was evacuated from beneath the graft, pressure was reapplied and the autograft then went on to good healing as did the donor site. —*Carl Schiller, M.D.*

Investigations into Different Methods of Treating Pyocyaneus-Infected Burns. BENGT KÖRLOF. *Acta chir. scand.*, 1954, 107: 244.

THE exposure treatment of burns appeared to decrease the incidence of Pseudomonas pyocyanea infection and therefore experimental studies were undertaken to test this hypothesis. One hundred and thirty-two male guinea pigs, divided into 11 groups of 12 pigs each, were used in this study. The animals re-

ceived standard burns of the back while under ether anesthesia, the hair having been shaved off first. The standard burns covered 490 sq. mm. and were produced by contact with a copper burner at 185 degrees C. for 15 seconds. The coagulated tissue was immediately excised and the wound inoculated with a Pseudomonas pyocyanea strain from a patient with infected burns. The standard dose was 0.1 ml. of a 1:1,000 dilution of a 24-hour broth culture. The wounds were then treated by a chemical agent (polymyxin B, phenoxetol, chlorophyll, and sodium chloride) or by the exposure method. Dressings were changed every 48 hours, cultures were taken, and photographs of the wound were made. The weight and temperature were recorded daily before and after burning.

Polymyxin B (75 I.U./ml.) was used in a dose which was eight times the inhibiting dose for this strain of bacteria in vitro. No effect on the bacteria or the healing time as compared to the saline controls was noted. Some of the animals developed signs of toxicity such as an itching nose, dizziness, and flaccid paralysis of the hind legs. Intramuscular administration of polymyxin also failed to have any effect on the pyocyaneus infection.

Phenoxetol (2.2%) with septin (0:01%) was applied locally to a series of burn wounds. In vitro the phenoxetol was inhibiting to the organism, and the septin was added to prevent the overgrowth of other bacteria. In spite of the in vitro inhibition of the bacteria by phenoxetol, it had no effect when it was used locally on the burn wounds.

Chlorophyllin was applied to 4 groups of 12 guinea pigs each. No positive effect of the treatment could be observed in any of the groups.

Thick heavy dressings were used in some of the groups and light porous dressings in others, while still others received no dressings. The mortality was less in the groups which had light porous dressings or no dressings at all, regardless of the local agent applied.

The weight measurements indicate that the exposure treatment produces less weight loss than either light dressings or heavy dressings. This is presumably caused by the decreased incidence of infection in the exposed burns. —*John H. Davis, M.D.*

Human Rabies; Report of 3 Cases. Ethel E. Erickson, Peter M. Marcuse, and Béla Halpert. *J. Am. M. Ass.*, 1954, 154: 823.

Three patients who presented bizarre symptoms suggesting involvement of the central nervous system are the subject of this report. In none was the clinical diagnosis of rabies made. At autopsy thorough searching for the cause of death revealed the pathognomonic Negri bodies in the brain tissue. In each instance, subsequent inquiry disclosed that the patient had had direct contact with a suspected rabid dog or had been bitten by a rabid dog.

Rabid animals constitute the reservoir for human infection with rabies. The greater the incidence of rabies in animals in a community, the greater the opportunities for human rabies. Thus the control of rabies, both animal and human, depends on the laws and regulations concerning potentially rabid animals and on the enforcement of such laws. Inadequate laws or failures in enforcement lead to outbreaks of rabies in animals and to occasional infection in man. Therefore, in communities where rabies in animals is prevalent, when a patient presents obscure severe nonlocalized central nervous system manifestations that culminate in death, rabies should be considered as a possible cause.

Not all patients who die are examined post mortem, and the brain is not always included in the examination. Whenever there is a suspicion that a patient has had rabies, a search should be made for the characteristic lesions in the brain so that the disease may be identified. This is important because the recorded increased incidence of human rabies in a community focuses attention on its source and leads to enforcement of laws and regulations. This in turn decreases rabies in animals and reduces the chances of transmission to other animals and to man.

—*Benjamin Goldman, M.D.*

Actinomycosis, with Special Reference to Its Treatment with Penicillin. R. Wilenius. *Ann. chir. gyn. fenn*, 1954, supp. 4.

The writer reports 29 cases of actinomycosis treated with penicillin. Of these, 22 were cervicofacial, 3 thoracic, 2 abdominal, and 1 was cutaneous and 1 gingival. All of the patients were cured except 1 with abdominal actinomycosis whose condition improved greatly and is now stationary. No information was available in the case of 1 patient with cervicofacial actinomycosis.

The introduction of penicillin treatment has greatly improved the exceptionally bad prognosis for actinomycosis, especially in the thoracic and abdominal forms.

Daily doses of 400,000 to 600,000 units of penicillin suffice as a rule, but the treatment must be prolonged over an adequate period. In the highly resistant cases the dosage must be increased. One should possibly try other antibiotics. Very high doses of penicillin are not necessary as a rule. Resistance tests and examination for the possible presence of penicillinase should be made before treatment is started. Penicillin treatment does not exclude the necessity of surgical interference, mainly incision and drainage of abscesses, and removal of necrotic tissue. On the contrary, it appears that penicillin treatment would make more radical surgical treatment possible.

—*Benjamin Goldman, M.D.*

The Use of Procaine Amide in the Treatment and Prevention of Penicillin Reactions. Paul B. Jennings and Sidney Olansky. *Ann. Int. M.*, 1954, 40: 711.

There is increasing need for means to prevent or correct reactions to penicillin as the incidence and severity of those reactions increase. The vasoconstrictors (epinephrine and ephedrine) and antihistaminics offer temporary relief only. Cortisone and ACTH control symptoms during therapy, which is costly, but relapses occur when treatment is discontinued. The antihistaminic-like action of intravenous procaine in allergic illnesses has led to its use in penicillin reactions, mostly for control of pruritus. Difficulty of administration and toxic effects render it not satisfac-

tory in many cases. Oral procaine, as its amide, pronestyl, has been investigated for its possible value in treating drug reactions. In patients with heart disease it must be used with care to avoid heart block. Mild reactions, dizziness, anorexia, and insomnia, are caused in some patients.

It seems that pronestyl has greater value in preventing reactions to penicillin in persons known to be sensitive to it, than as a remedy for the once established reaction. In the latter group, however, its beneficial effects are at least as good as those produced by benadryl. —*Leonard D. Rosenman, M.D.*

Antibiotic Anaphylaxis. JASON E. FARBER, JOSEPH ROSS, and GEORGE STEPHENS. *California M.*, 1954, 81: 9.

THE CONTINUED USE of penicillin and other antibiotics has sensitized large numbers of the population to these drugs. An unfortunate by-product of this circumstance is the occurrence of an increasing number of serious and even fatal anaphylactic reactions following the administration of antibiotic agents. In the 1953 literature there appeared reports of a total of 88 anaphylactoid reactions with 25 deaths collected from a sampling survey of 95 hospitals across the country. The authors of the present article report 2 cases in which nearly fatal reactions occurred and 2 cases in which a rapid fatality resulted after the use of penicillin and in which the drug had been used previously without ill effect.

Attention is called to the fact that a careful appraisal of the problem discloses that many of the fatalities following the injection of penicillin have occurred in recent years. This suggests to them a long and silent period of sensitization to the antibiotic and that now the chance of an anaphylactic reaction has become far more possible.

Various forms of penicillin have caused anaphylactoid reactions. It is believed that upon injection they unite with the serum proteins to form antigens giving rise to specific antibodies. Then after immunologic conditions are thus created, another injection of the antigen produces an antigen-antibody reaction, setting loose in the blood stream histamine or histamine-like substances which precipitate the alarming shock-like syndrome. Both experimentally and clinically antihistaminic agents have been shown to counteract these histamine substances and are therefore indicated in the treatment of the condition.

In the production of anaphylaxis, substances other than histamine may also be responsible. There is some evidence that a cholinergic substance, possibly a peptone, or a muscle-stimulating compound similar to snake venom or lecithins may share etiologically with the histamines. Undoubtedly, there are multiple anaphylatoxins involved in these explosive reactions. The pathogenetic mechanism is still shrouded in biochemical and immunologic mystery.

In the discussion of the prevention of reactions, the authors warn of the necessity for an awareness of the danger of anaphylaxis. Obviously penicillin and related antibiotics should be used only when there is a definite need or indication for the drug. They should not be given to patients who previously have had any of the various allergic manifestations to the drug. Unless really necessary, they should not be used in persons who have had or who have hay fever, bronchial asthma, or allergic conditions. The tetracyclines may be more safely prescribed for those patients. A positive and immediate reaction to skin test with the antibiotic controverts its use. A negative reaction does not rule out the possibility of anaphylaxis. Intravenous injection of penicillin should by all means be avoided.

During the years 1944 to 1951, before the authors used antihistaminic solutions prophylactically, seven severe anaphylactoid reactions were observed in a series of more than 1,000 injections of penicillin, streptomycin, or dihydrostreptomycin alone or in combination. Since that time, antihistaminic solutions have been combined with the antibiotics as routine procedure and no severe anaphylactoid reactions have been noted in more than 3,000 injections. The antihistaminic solutions that the authors have used have been aqueous benadryl, in a quantity of 10 to 20 mgm., pyribenzamine solution in the same strength, histadyl solution in a strength of 20 to 40 mgm., or 4 mgm. of chlortrimeton. Each of these preparations has been equally effective in preventing these shocklike reactions. These antihistaminic drugs are simply added to the diluent before mixing.

If a reaction occurs and the patient can be tided over the first several minutes, the chances of survival are good. Hence, immediate vigorous treatment is imperative. Epinephrine in a 1:1,000 solution intramuscularly, and antihistaminic solutions intravenously should be administered at once and repeated as necessary. Intravenous injections of aminophyllin have also been recommended. These drugs should be available whenever penicillin is being injected. Oxygen should also be given as soon as possible and preferably under positive pressure to combat pulmonary edema. It is important to prevent obstruction of the airways.

—*Matthew H. Evoy, M.D.*

Consequences of the Widespread Use of Antibiotics. LOWELL A. RANTZ. *California M.*, 1954, 81: 1.

THE AUTHOR brings to our attention the enormous amount of antibiotics that is being produced in the United States each year. The most important and readily demonstrable outcome of the widespread and reckless use of the antibiotics has been the selective elimination of many of the antibiotic-sensitive forms and the emergence of resistant variants as causes of human disease. In 1943, for instance, 90 per cent of all strains of staphylococcus aureus were inhibited by a few tenths of one unit of penicillin per cubic centimeter. This situation still prevails in those parts of the world where few antibiotics are used. At present, 50 to 90 per cent of all strains isolated in the clinical bacteriologic laboratory are intensely resistant to the action of this antibiotic. Evidence obtained by culture of the respiratory tract of nonhospitalized patients suggests that the "wild" staphylococci among the population at large are much less frequently penicillin-resistant than are those harbored in the noses and throats of hospital personnel. As a direct result of this, staphylococcus infections acquired by patients in hospitals, or by physicians and nurses, are quite universally penicillin-resistant.

Equally disturbing has been the development of intensely tetracycline-resistant staphylococci during

the brief period that oxytetracycline and chlortetracycline have been in clinical use. Erythromycin was substituted for penicillin in the routine treatment of patients in a midwestern hospital. Within 5 months 70 per cent of all staphylococci isolated from the upper respiratory tracts of workers in that institution were resistant to the action of that drug although all had been sensitive when the experiment began. There can be no doubt that many infections were caused by these resistant organisms. It is evident that staphylococci are highly adaptable microorganisms and it will be fortunate indeed if antimicrobial therapy remains effective for any great length of time in the treatment of infections caused by them.

Very similar changes have been seen in the large family of gram-negative bacilli, particularly among the coliform-aerobacter group. Some years ago a very high percentage of these organisms was sensitive to the action of streptomycin and tetracycline.

A second extremely important development, directly the result of the widespread use of antibiotics, has been the increasingly frequent occurrence of infection by organisms which were virtually unknown a few years ago as causes of disease. The present clinical importance of the various pigmented gram-negative bacilli, of which the Pseudomonas group is the most important, is outstanding. These organisms, generally intensely resistant to most or all of the available agents, are now common causes of urinary and respiratory tract infection, particularly in antibiotic-treated patients. Bacteremia, meningitis, and empyema are also now commonplace.

A third interesting and, at times, extremely serious outgrowth of antimicrobial therapy has been the clinical problem known as superinfection. This term simply denotes the appearance of an infectious process caused by an organism different from that which was responsible for the initial infection for which the patient was brought under antimicrobial therapy. Such superinfections may occur in the same area as the original process or in a different one. The former is seen most frequently in relationship to the urinary tract and to the lung. The latter may occur in the bowel where staphylococcus and other forms of bacterial enteritis are common, in the lung, the meninges, the endocardium, and other sites. The pathogenesis of such superinfection is believed to be as follows: the use of antibiotics (particularly those of the broad spectrum group) suppresses the normal flora of the body cavities and eliminates the bacteria that usually cause disease in the various areas of the body, and this paves the way for invasion by resistant organisms. Some kind of competition undoubtedly exists between the normal and the disease-producing bacteria, which probably is one of the protective mechanisms by which the body deals with organisms that reach potentially infectable areas. Recognition of this superinfection is of the greatest importance. It tends to occur in specific situations, particularly in the presence of obstructive disease of the urinary tract or of structural disease of the lung, in special kinds of people—notably diabetics, alcoholics, infants, the aged, and the otherwise chronically sick or injured.

Clinical recognition of superinfection is not difficult if there is at first striking improvement for a few days after the beginning of antimicrobial therapy, then relapse. In such circumstances superinfection may be assumed to be present. In many instances, however, this important complication occurs without any intervening period of definite alteration for the better in the clinical course. For this reason superinfection must be always suspected in a patient with an infectious disease which does not respond to antimicrobial therapy in the predicted fashion. If antibiotics are given for 72 to 96 hours without definite improvement, superinfection must be strongly suspected if we do not have laboratory facilities to give us more proof. Almost always in such cases it is better to change to another drug, since if superinfection is present it is always resistant to the action of the antibiotic that is already being administered.

The final important effect of the widespread use of antibiotics, and the emergence of organisms resistant to their action, has been the stimulation of research on several fronts. On one front are the large commercial drug firms, who have constantly sought new antimicrobial agents which might be useful in the treatment of resistant infection. Outstanding examples are bacitracin and erythromycin, introduced primarily for the treatment of resistant staphylococcal disease, and polymyxin, whose principal role is in the treatment of Pseudomonas infection. A second important development has been a keen interest in the potential role of combined antibiotics in the treatment of disease. Lastly, it has been necessary to re-evaluate methods and techniques. The medical profession is rapidly becoming aware that it must discriminate in the use of antibiotic drugs so that these valuable chemicals will not be wasted in the treatment of trivial disease or in needless prophylaxis, lest the time arise when they will not be available as life-saving agents in patients with serious infections.

—*Matthew H. Evoy, M.D.*

ANESTHESIA

Vomiting and Regurgitation During Anesthesia. E. J. O'Mullane. *Lancet*, Lond., 1954, 1: 1209.

The present investigation was undertaken to test the safety of the technique of Morton and Wylie, who advocated that the footdown tilt be adopted before inducing anesthesia with thiopentone and muscle relaxants in patients whose stomachs may not be empty.

Presumably the assumption is that the hydrostatic pressure within the stomach is insufficient to force the stomach contents, against gravity, up to the level of the vocal cords when the abdominal muscles and the diaphragm are paralyzed.

The experiments were made on conscious volunteers and on patients having anesthesia for various operations. The method employed, factors affecting intragastric pressures, factors affecting the cardia of the stomach, the effect of ganglion-blocking drugs, local anesthesia, attempts to make the cardia incompetent, and the factors affecting cricopharyngeal sphincter are discussed in detail.

It appears that the technique of Morton and Wylie for the induction of anesthesia in patients whose stomachs are not empty is safe, because the cardia is

not made incompetent by total somatic paralysis. If the cardia were incompetent, the intragastric pressure would not remain high enough to force fluids against gravity up to the level of the vocal cords unless the abdomen were greatly distended.

The author concludes that the so-called sphincter at the lower end of the esophagus acts not as a sphincter but as a valve, which allows fluids and solids to pass easily from above downwards but obstructs their passage from the stomach into the esophagus. The competency of this valve is independent of either somatic or autonomic nerve supply. It was found to be completely competent during full muscular paralysis, after full doses of ganglion-blocking drugs, and after infiltration of the area with local anesthetics.

The cricopharyngeal sphincter, on the other hand, acts like a sphincter normally, but as a valve when paralyzed, although not quite so efficient as the cardia. It gives easy exit to fluids from esophagus to pharynx but not in the reverse direction. The muscle of this sphincter is relaxed by muscle relaxants, but even in this paralyzed state tends to obstruct the entrance of either fluid or air from the pharynx to the esophagus, but not in the reverse direction.

The esophagus can hold an appreciable quantity of fluid, which may only make its appearance in the pharynx when the cricopharyngeal sphincter is relaxed by deep anesthesia or by muscle relaxants, and a positive pressure difference exists between the esophagus and the pharynx.

The cardia may be made incompetent by obstructing inspiration during anesthesia when the intra-abdominal pressure is high.

—*John H. Mohardt, M.D.*

Effect of Azotemia upon the Action of Intravenous Barbiturate Anesthesia. JOHN W. DUNDEE and RICHARD K. RICHARDS. *Anesthesiology*, 1954, 15: 333.

TODAY the predominate role of the liver in the metabolic degradation of the clinically important barbiturate derivatives, as, for instance, thiopental or hexobarbital, is sufficiently evident. However, although for some time the kidneys generally were not considered involved in the degradation of short-acting barbiturates, recent work reveals that they possess some ability to destroy thiopental. New observations, however, appear to be of greater importance; these indicate that experimental animals, especially rats and rabbits, react with increasingly prolonged sleep to injections of thiopental as the time interval after nephrectomy or ligation of the ureters and the concomitant azotemia increases. Hexobarbital shows this change to a markedly lesser degree. Under appropriate conditions an acutely increased sensitivity to thiopental as measured by prolongation of sleeping time can be obtained by the injection of an artificial urea solution, leading to sudden azotemia.

Clinical studies are in essential agreement with these experimental findings. Patients undergoing prostatectomy and suffering from azotemia attributable to urinary obstruction required significantly less thiopental for induction and maintenance of anesthesia than a comparable group with normal blood urea level. Several patients subjected to thiopental anesthesia at different times with and without increased level of blood urea needed less of the drug during the azotemic stage. In normal human beings in whom the blood urea level was artificially raised by fluid restriction and oral administration of urea, anesthesia could be maintained with considerably smaller doses of thiopental than in a control group. The factors involved in these phenomena and their clinical significance are discussed.

—*LeRoy J. Kleinsasser, M.D.*

A Study of the Deaths Associated with Anesthesia and Surgery; Based on a Study of 599,548 Anesthesias in 10 Institutions from 1948 to 1952 Inclusive. HENRY K. BEECHER and DONALD P. TODD. *Ann. Surg.*, 1954, 140: 2.

TEN TEAMS, consisting of an anesthetist, a surgeon, and a secretary, worked for a 5 year period in 10 university hospitals scattered widely over the United States. All deaths occurring on all of the surgical and surgical specialty services were examined and appraised as to cause of death by the team working in each of the participating hospitals. Final decisions were made by the local team in each hospital, usually after full staff discussion. These decisions were made as soon after each death as the relevant material could be assembled by those who were on hand at the time the death occurred. It is to be emphasized that in this study there was nothing voluntary or selective about reporting of the deaths, once an institution with its team had agreed to participate. A point is made of this fact, since studies of intermittently, casually, or partially reported deaths can never get to the center of a problem of this kind. All deaths were categorized and reported. The designation as to cause of death was made in the institution where it occurred; this classification was not altered in the central office.

Reports to the central office were made at 4 month intervals by each of the participating hospitals; thus each institution sent in 15 reports over the 5 year period. In these reports, the cause of death was characterized as due to patient's disease, error in diagnosis, error in surgical judgment, error in surgical technique, or death due to anesthesia. For 2 weeks during each 4 month period, the numbers of certain key operations were tallied in order to check the uniformity of the surgical material in the 10 institutions. A sampling of the ages and races of the patient material was made on all patients present in the 10 hospitals on two dates considered representative.

From the data collected on 599,548 anesthesias, the following observations can be made for the period of this study.

1. A fifth of the anesthesias in these 10 university hospitals are administered by nurses; i.e., twice as many as are administered by physician specialists in anesthesia. On the other hand, in the 5 year period of this study, while the number of anesthesias increased by 18 per cent, those administered by nurses increased by only 3.5 per cent (a relative decrease), whereas those given by physician specialists increased 34 per cent, and those given by anesthesia residents increased 40 per cent. This reflects the current trend.

2. Inhalation anesthesia is by far the single most important technique, but the use of intravenous anesthesia has doubled in the period of study while use of

the spinal technique has declined somewhat; it accounts, surprisingly, for less than 9 per cent of the cases.

3. The use of ether as a primary anesthetic agent is steadily increasing, while the use of cyclopropane is not rising. Ether alone or in its various combinations is used three and a half times as often as cyclopropane alone or in its various combinations.

4. The closed, circle filter arrangement has acquired and held an important place; but in the period of this study there has been a great increase in the semi-open technique. There has been a great reduction in the use of the to-and-fro filter. The tremendous increase in the use of "controlled respiration" probably has been required by the widespread use of the muscle relaxants.

5. Most spinal anesthesia is carried out with tetracaine (pontocaine) or procaine. There has been a sharp decline in the use of dibucaine (nupercaine) in the 5 years. Heavy solutions are far more widely used than light ones. The continuous or multiple dose techniques of spinal anesthesia have greatly decreased in use during the course of this study.

6. Procaine is by far the most commonly used agent for local or regional anesthesia. The use of cocaine for topical anesthesia has remained steady over the last 4 years, whereas the use of tetracaine (pontocaine) for this purpose has sharply fallen in the period of this study.

7. Endotracheal intubation is used principally with inhalation anesthesia; but there has been a very great increase in its use as an adjunct to intravenous anesthesia; probably this is a reflection of the employment of this combination with muscle relaxants. In this study as elsewhere, cuffs on tubes, although indicated for certain procedures, are found to have a mortality of their own.

Concerning the use of muscle relaxants (curare), the authors make these statements. When there was sufficient data to judge, no impressive differences in death rate among the several muscle relaxants were observed here. While the data are too few to permit establishment of rates for the newer agents, death has occurred in association with each, including the new succinylcholine. No pretext is made of being able to spot a "curare" death apart from what has been defined as an anesthesia death. The significant point is that when the muscle relaxants enter the situation, the anesthesia death rate increases nearly six-fold, from an anesthesia death rate of 1 to 2,100 (based on 266 anesthesia deaths) to a rate of 1 to 370 (based upon 118 anesthesia deaths among 44,100 patients who received "curare"). These data suggest that the widespread custom of using "curare" for many trivial purposes is not justified.

On the basis of the foregoing observations one can ask what, practically, seems to be a sensible attitude toward the clinical use of the muscle relaxants? The authors do not believe that they should be banned, but that they should be studied further. Advances apparently are being made. For example, there is the desirable fleeting action of the new succinylcholine. The data presented strongly suggest that great caution in the use of the muscle relaxants is indicated, that the agents available at present be considered as on trial, and that they be employed only when there are clear advantages to be gained by their use, that they not be employed for trivial purposes, or as a corrective for generally inadequate anesthesia.

—*John J. Maloney, M.D.*

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

The Central Veins and Deep Dural Sinuses of the Brain; an Anatomical and Angiographic Study. CURT JOHANSON. *Acta radiol.*, Stockh., 1954, supp. 107.

COMPARATIVELY little attention has been accorded the deep veins and dural sinuses in the literature thus far. This monograph supplies this information in its more than 170 pages with approximately 90 highly informative figures, some containing two or three roentgenograms and/or line drawings.

Using barium sulfate as the contrast medium, the author injected 75 brains at post mortem, which were then roentgenographed in different projections within and outside of the skull. In addition, the roentgenograms of many patients studied clinically were reviewed.

The normal anatomy is excellently demonstrated. Considerable attention is paid to anatomic anomalies. It is noteworthy that the position of the central veins and deep dural sinuses with relation to the various brain structures remained relatively constant, but the course and position of some of the vessels, particularly the internal cerebral vein, differed somewhat from the descriptions in the literature. In most instances the autopsy and clinical material looked the same roentgenographically. The central veins and deep dural sinuses repeatedly revealed highly characteristic patterns.

Having reviewed the healthy brain in detail, the author then discusses systematically the findings in patients with proved expanding lesions of the brain. Among the observations recorded are the following:

a. Dilated lateral ventricles, which cause downward and backward displacement of the internal cerebral vein with no lateral displacement. The great vein of Galen also is displaced backward and downward. The extent to which the course of these vessels is straightened depends upon the degree of dilatation of the lateral ventricles.

b. Suprasellar and parasellar lesions, which may displace the internal cerebral veins upward and backward; usually this happens only in the presence of large lesions.

c. Expanding frontal lobe lesions, which may displace the central veins laterally, upward, backward, or downward, their deflections commonly being greater or less than those of the adjoining arteries. In the absence of an adjoining tumor circulation, the caliber of an individual vein may be increased when a tumor is present nearby and drains into it.

d. Central veins in the parietal and occipital lobes, which may be displaced across the midline, downward, and sometimes upward. Rarely does the pattern of the central veins reveal a sufficient amount of distortion to demonstrate extension of a tumor into the lateral ventricle.

e. Expanding lesions in the temporal lobe, which may displace the central veins; usually the basal veins are more prominently displaced.

f. Upward deflection of the entire cerebral vein in the region of the basal ganglia and unaccompanied by hydrocephalus tumors. In the presence of hydrocephalus, however, basal ganglia tumors commonly do not cause this upward deflection, which is neutralized by the dilatation of the lateral ventricle.

The physician interested in cerebral angiography will find this monograph to be a valuable supplement.

—*Philip J. Hodes, M.D.*

Intracerebral Arteriovenous Malformations; Their Diagnosis and Angiographic Demonstration. WENDELL G. SCOTT, WAYNE A. SIMRIL, and WILLIAM B. SEAMAN. *Am. J. Roentg.*, 1954, 71: 762.

DURING the past 20 years the recognition of intracerebral arteriovenous malformations has assumed increasing importance because of the fact that advances in neurosurgical techniques have made many of them amenable to extirpation. During the same period the progress achieved in perfecting cerebral angiography has greatly facilitated the roentgen demonstration and accurate localization of these lesions, which apparently are a more frequent cause of intracranial disorders than was formerly believed.

In this excellent and beautifully illustrated article the authors deal with the embryology, pathology, diagnosis, angiographic visualization, prognosis, and treatment of the intracerebral arteriovenous malformations. They pay special attention to biplane cerebral angiography and briefly describe the biplane angiographic unit designed by Scott and associates, utilizing two roll film cassettes mounted at right angles and synchronized with self-cocking grids. In this unit a thyrotron timer permits the regulation of the frequency, the length of a series of exposures, and the time interval between each series. Exposures in the horizontal and vertical planes are made alternately, usually at 1/20 of a second and at the rate of two per second.

The authors' experience is based on a total of 22 cases of intracranial arteriovenous malformations. These cases are presented in tabular form by listing the diagnosis, initial symptoms, presence or absence of subarachnoid hemorrhage, presence or absence of bruit, treatment, and follow-up. In 2 additional tables they enumerate the physical findings and the history and symptomatology of the cases.

Some of the conclusions reached are as follows: intracerebral arteriovenous malformations can be separated into two groups: (1) the arterial angiomas with arteriovenous connections, and (2) the carotid-cavernous sinus or ophthalmic vein fistulas. Because of the congenital nature of the lesions, the symptoms and physical signs appear early in life; therefore, all children with convulsive seizures or epileptic manifestations should be examined with the possibility of an intracerebral vascular malformation in mind.

Cerebral angiography, preferably with biplane serialized units, must be considered indispensable in the examination of these patients for the evaluation of

the location, size, and extent of the malformations and the demonstration of their vascular connections. The treatment consists of surgical extirpation whenever feasible. The criteria for such a procedure are based on the comprehensive angiographic findings, due regard being paid to the neurological damage that may result from the surgical effort as compared to the severity of the symptoms and the ultimate prognosis. In the group of angiomas with arteriovenous communications, ligation of the feeding arteries or of the internal carotid artery led to disappointing results and the response to radiation therapy remained indefinite. In the considerably smaller group of carotid-cavernous sinus fistulas, ligation of the internal carotid artery proved to be an effective measure. The size of the vascular malformation was found to be relatively unimportant since even the smallest lesion can produce a devastating picture by virtue of its location or tendency to bleed.

An extensive bibliography is appended.

—*T. Leucutia, M.D.*

Temporary Unilateral Occlusion of the Pulmonary Artery: a Method of Roentgen Examination of the Pulmonary Vessels. BJÖRN NORDENSTRÖM. *Acta radiol.*, Stockh., 1954, supp. 108.

A METHOD of producing temporary unilateral occlusion of a pulmonary artery to carry out a roentgen study of the pulmonary vessels is described. A series of preliminary experiments, utilizing 5 different catheterization tubes as well as a recoil free single lumen catheter, was performed on dogs. To familiarize the reader, a brief review of the pulmonary vascular pattern of the dog is presented. The animals were sacrificed at varying intervals after the injections of contrast media and the pulmonary arterial walls were carefully studied for evidence of any damage. The animals experienced little or no systemic effects from the procedures. The three major problems in this study are described:

1. Selective angiocardiography of the vessels of the occluded lung. A definite decrease in pulmonary arterial blood flow in the vessels of the occluded lung is demonstrated by roentgenograms with an electrokymogram as well as direct comparison of the vessels of each lung before and after occlusion of the pulmonary arteries. Because of rapid disappearance of the contrast media distal to such an occlusion, a method of investigation as well as a demonstration of the effects of the bronchial arteries and their relationships to the pulmonary arteries and veins, is roentgenographically investigated. At the same time a method of selective angiography of the pulmonary veins is presented.

2. Roentgen examination of the vessels of a lung during occlusion of the contralateral pulmonary artery revealed an increase in the lumenal size of the vessels in the nonoccluded artery and also visualization of the veins in the occluded pulmonary artery. This is postulated as being secondary to atrial pulsations in the left auricle with resultant backflow into the veins of decreased pressure on the occluded side.

3. Temporary unilateral occlusion of the pulmonary artery has been carried out without event in 17 human patients with the following diseases: pulmonary tuberculosis, arteriovenous aneurysm, hemoptysis and bronchiectasis, pulmonary fibrosis, pulmonary embolism, cancer of the lung, pulmonary cyst, and pulmonary hypertension.

Many finely reproduced illustrations are given.

—*Roy R. Greening, M.D.*

Localized Organizing Pneumonia: Its Resemblance to Carcinoma. Review of Its Clinical, Roentgenographic, and Pathologic Features. LAUREN V. ACKERMAN, GLADDEN V. ELLIOTT, and MARIO ALANIS. *Am. J. Roentg.*, 1954, 71: 988.

ORGANIZING pneumonia is often extremely difficult, if not impossible, to differentiate from bronchogenic carcinoma. The diagnostic procedures employed in 15 cases, in which operations were performed following an erroneous diagnosis of bronchogenic carcinoma, are discussed. Ackerman believes that while a correct diagnosis of organizing pneumonia might become obvious if sufficient time were allowed to elapse, this course should not be followed because undue delay might cause great harm in an individual case if the lesion should prove to be malignant.

Even though early operation should not be deferred if a malignancy is considered, preliminary studies as well as frozen sections at the time of operation should be routinely performed because the surgical procedure is more conservative in the case of a benign lesion. Frozen section gave the diagnosis in 14 of 15 cases.

Body section roentgenography is very important. The demonstration of patent bronchi, calcification within the mass, involvement of multiple segments, and extension to pleural surfaces are the roentgenographic criteria favoring benignity. Any suggestion that the process is inflammatory rather than malignant should aid both the pathologist and the thoracic surgeon at the time of operation.

It would seem that the fibrous and chronic inflammation present in these cases of localized organizing pneumonia results in sepsis, which accounts for the weight loss and chronic illness. In view of the pathologic findings in these cases, it seems unlikely that full resolution could be expected. Twelve roentgenograms and 4 photomicrographs are presented.

—*Henry P. Pendergrass, M.D.*

The Significance of Bronchography in the Treatment of Pulmonary Tuberculosis (Die Bedeutung der Bronchographie für die Therapie der Lungentuberkulose). P. THURN. *Fortsch. Roentgenstrahl.*, 1954, 80: 198.

THE AUTHOR presents 13 roentgenographic reproductions to demonstrate the significance of bronchography in the treatment of pulmonary tuberculosis.

The first roentgenogram presents an instance of rather recent pulmonary tuberculosis with a large cavity in the apicoposterior segment of the left upper lobe, and obvious early changes in the involved part of the bronchial tree; there are present irregularities in the bronchial walls, small cylindrical bronchial dilatations, and inequalities of caliber in the branches, of subsegmental type. Here pneumolysis may yet permit adequate collapse therapy for obliteration of the cavity, and under streptomycin or other treatment the bronchial changes may regress.

The second roentgenogram demonstrates an instance of pulmonary tuberculosis with more advanced changes (of 3 years' duration). Although the cavity has filled passively, showing preservation of the respiratory function of the apicoposterior segment, there are present bronchiectatic changes in the inferior lingula segment and in the posterobasal and laterobasal segments of the lower lobe. The advanced bronchiectatic changes in the upper lobe would seem to exclude collapse therapy, and antibiotic treatment has been unavailing. Lobectomy must be considered; however, if such operation is decided upon, bronchography must be systematically carried out for the entire left lung over a period of 2 years, in order to detect postoperative bronchiectasis in the remaining lung.

The third roentgenogram shows the bronchogram of a patient in whom a rightsided process has been present for 5 years. This condition could not be satisfactorily influenced by conservative means. In addition to advanced bronchiectatic changes in the involved lobe, there are present changes in the remainder of the bronchial tree of the right lung. Here the author agrees with F. K. Fischer—that for this type of pathology a lobectomy is indicated, but it should be preceded by an intensive course of chemotherapy in order to forestall as much as possible the postoperative development of bronchiectatic changes in the remainder of the bronchial tree.

The fourth roentgenogram illustrates the postoperative development of these bronchiectatic changes. In the 6 months following removal of the upper lobe, the bronchiectatic changes in the middle and lower lobes have become notably more severe; nevertheless, in such conditions lobectomy is preferred to pneumonectomy as a primary procedure.

The fifth bronchogram greatly resembles the condition illustrated in the third bronchographic reproduction. Here the right-sided pulmonary tuberculosis has been present for 3 years. Chemotherapy proved to be ineffective and the patient has been treated with pneumothorax, which has been complicated by the presence of an empyema. A cavity in the upper lobe persisted unchanged. A Schede operation was nevertheless decided upon, and the sixth bronchogram shows that 7 months after the plastic operation the bronchiectases in the upper lobe have remained unchanged; a cavity could not be demonstrated tomographically; the sputum was still positive. In this instance (tuberculous bronchitis), unless the upper and middle lobes can be excised, involvement of the remainder of the bronchial tree in the drainage area can be anticipated.

The seventh bronchogram merely shows a condition in which only a pneumectomy is to be considered.

The eighth bronchogram shows the condition existing after 18 months of drainage. The contrast material was injected through the opening in the chest wall. Remarkable here is the shrinking together (contraction) of the upper lobe, unaccompanied by bronchiectasis, and the normal appearance of the remainder of the bronchial tree on this side. This, in the author's opinion, illustrates the influence of continued bronchiectatic secretions in the involvement of further bronchial tracts, and the uselessness of space-diminishing operations in bronchiectatic patients.

The ninth bronchogram presents a high grade stenosis of the bronchus to the apicoposterior segment of the left upper lobe. Here the stenosis could not be seen bronchoscopically and only the bronchogram could indicate the need for segmental resection as the proper surgical approach, an indication which was fully substantiated by the subsequent examination of the resected specimen.

The tenth bronchogram presents a stenosis of the bronchus to the right upper pulmonary lobe, and further towards the segmental branch a complete closure. The stenosis could be seen bronchoscopically, but the peripheral closure could only be demonstrated bronchographically.

The eleventh bronchogram presents the condition of the left lung after 6 years of tuberculosis which could neither be influenced by chemotherapy, nor by collapse methods. The inspiratory suction in this instance was entirely absent, so that depiction of the changes present could only be accomplished when the catheter had been introduced far in a distal direction, and when the contrast material had been injected under strong pressure. In such cases the "blind" exploratory bronchogram is useless; under fluoroscopic control, the entire bronchial tree must be depicted. Neither an isolated segmental nor a lobar depiction is sufficient; the findings in the lower lobe may be the determining factors in the choice between a plastic operation or a lobectomy.

The twelfth bronchogram together with the laterolateral projection (Fig. 12a) presents a condition in which the stenosis of the lower lobe bronchus immediately at its branching off from the left main bronchus was missed as a result of distortion of the entire bronchial tree. Pneumonectomy (all that could be considered) was contraindicated by the bronchographic examination since it cast doubt on the ability to close securely the bronchial stump in healthy tissue. Here inhalation therapy with neoteben finally sterilized the sputum and gave at least temporary relief to the patient without surgical treatment.

The thirteenth bronchogram illustrates an early involvement of isolated-cavernous, open, right-sided lower lobe tuberculosis with evident deformation and ectasia of the bronchial tree. Here preference is to be given to chemotherapy under bronchoscopic and bronchographic control in order to detect the success or failure of the treatment in the avoidance of bronchial stenosis, thus enabling the examiner to determine the proper moment to institute surgical interference (lobectomy or the excision of several segments).

—*John W. Brennan, M.D.*

Involvement of the Mediastinum by Bronchial Carcinoma. An Attempt to Recognize Its Influence on the Movements of the Esophagus (Zur Frage der Mitbeteiligung des Mediastinums beim Bronchialkarzinom. Versuch der Erkennung einer Mitbeteiligung des Oesophagus). F. STRNAD. *Fortsch. Roentgenstrahl.*, 1954, 80: 427.

UP TO the end of 1952, there were 150 esophageal kymograms made in the right, anterior oblique projection. Seventy-six of these could be evaluated; 67 revealed tumor and in 53 of these the interpretation of the findings was substantiated by pneumonectomy,

biopsy excisions, or autopsy. In 50 of these 53 substantiated findings, the author's interpretation with reference to the location and degree of involvement of the mediastinum was found to be correct. In the remaining 3 instances, in which the interpretation was found to be incorrect, the examinations were conducted in the early period of the series.

In the meantime, of course, these examinations have continued with good results, which has led to the adoption of the method as a standard one for differential diagnosis of the expansive newgrowths of the lungs and mediastinum.

A number of kymographic reproductions in the original text give an idea of what one may expect to observe with this method of study. Essentially, the method consists in the kymographic registration of the pulsations imparted to the contrast-filled esophagus by the heart and large blood vessels. Normally the imparted pulsations are reduced in size at the area of the bifurcation of the trachea and, in lesser degree, at the point where the esophagus crosses behind the aortic arch; most active in the kymographic sense is the region of the left atrium and ventricle.

When the oscillations as depicted by the kymograph are decreased in the areas in which they should in a physiological sense be present, the phenomenon represents a certain means for estimating the position and extent of involvement of the mediastinum. This finding is always of value to the chest surgeon in that it enables him to be prepared for the places where he may expect to meet difficulties. However, the method goes farther than this; it actually provides, on occasion, a clue as to the nature of the mediastinal infiltrative process. Thus, a malignant tumor causes an essentially more pronounced inhibition of the kymographic oscillations than does a benign process. In fact, in any but a malignant process in the lungs or the mediastinum there is, as a rule, no noticeable inhibition of the oscillations at all.

The author, however, does not believe that the esophageal kymographic method is reliable as a basis for determining operability. The determination of operability of the carcinomatous process involving the mediastinal tissues still depends upon the operation of thoracotomy. It is the duty of the surgeon (with the aid of the kymographic findings) to decide whether any benefit can be expected from an excision of the whole or any part of the malignant process when it is exposed before him. —*John W. Brennan, M.D.*

Primary Lymphosarcoma of the Stomach. EDWARD L. JENKINSON, KEITH D. EPPERSON, and WILLIAM H. PFISTERER. *Am. J. Roentg.*, 1954, 72: 34.

THE AUTHORS encountered 8 patients (7 men and 1 woman) with primary lymphosarcoma of the stomach at St. Luke's Hospital, Chicago, from 1939 to 1951. At the present time the incidence of this lesion is considered to be 1.8 to 2.0 per cent of all malignant tumors of the stomach but it is probable that this estimate will be revised upward as differentiation from inoperable carcinoma of the stomach will be more clearly established.

In the authors' series, the average age of the patients was 54.5 years and, after excluding a 19 year old patient, 59.5 years, which corresponds to the average age of patients affected with primary carcinoma of the stomach. The average age of the patients with reticulum cell sarcoma of the stomach was 67.5 years.

TABLE I.—SURVIVAL AND TREATMENT

Type of treatment	*No. cases*	*No. living*	*Life span after onset of symptoms* *Living*	*Dead*	*Postoperative life span* *Living*	*Dead*
Gastrectomy and roentgen therapy.....	2	1	31 mo.	26 mo.	29 mo.	5 mo.
Gastrectomy....	2	1	39 mo.	9 mo.	28 mo.	10 days
Roentgen therapy.....	2	1	13 yr.	5 mo.*		
None.....	2	1	20 mo.	5 mo.		

*This patient received nitrogen mustard therapy also.

A careful review of the symptomatology, physical findings, and available laboratory data revealed nothing with which to differentiate lymphosarcoma from any other neoplasm or ulcer of the stomach.

The findings of the roentgenologic examinations are discussed in detail, reference being made to similar studies reported in the literature. The general impression was gained by the authors that there are no very reliable criteria permitting an accurate roentgen diagnosis of primary lymphosarcoma of the stomach. They are in agreement with other investigators who believe that this lesion is roentgenologically indistinguishable from carcinoma and sometimes from hypertrophic gastritis and gastric ulcer. However, the presence of roentgen findings in the stomach, out of proportion to the patient's general condition, should be suggestive of lymphosarcoma.

Histopathologically, the cases were evenly divided between lymphocytic sarcoma and reticulum cell sarcoma. The lesion was located on the lesser curvature in 4 cases, on the greater curvature in 1 case, in the cardia in 1 case, and on the posterior wall in 1 case; in the eighth case there was general involvement of the proximal three-fifths of the stomach. Metastases were present in all instances, either in the regional lymph nodes, abdominal viscera, or in distant parts of the body.

Treatment consisted of surgery, roentgen therapy, or a combination of both. The procedures employed and the results obtained are shown in Table I.

The 8 cases are reported individually and the more typical roentgenograms are reproduced to illustrate the pertinent findings. A bibliography of 11 articles is appended.

The authors conclude with the statement that "because of the hope that surgical excision and vigorous roentgen therapy offers to patients with lymphosarcoma, it is important to explore all gastric malignancies regardless of how extensive the roentgen findings may be." —*T. Leucutia, M.D.*

The Significance of Gas or Barium in the Biliary Tract. M. GILBERT SCOTT, F. PYGOTT, and L. MURPHY. *Brit. J. Radiol.*, 1954, 27: 253.

THE AUTHORS report a series of 10 cases in which gas or barium was demonstrated in the biliary tract on roentgen examination. The cases were observed over a period of 3 years at the Westminster Hospital and

Central Middlesex Hospital, London, England. The literature, to date, is reviewed and the authors publish a classified list of the collected cases, including a complete bibliography.

The 10 personal cases are presented in detail, with roentgenographic reproductions and line drawings for illustration of the pertinent points. In none of them was the presence of gas or barium due to infection of the biliary tract with gas-forming organisms. The first 6 cases exhibited regurgitation through the sphincter of Oddi without the presence of fistula formation, 2 cases exhibited spontaneous biliary fistulas, and in the remaining 2 cases the findings developed postoperatively, following biliary anastomoses. Six of the patients had had jaundice.

Plain roentgenograms of the abdomen showed the presence of gas in the biliary tract in cases 1, 2, 5, 6, and 10. Cholecystography revealed no concentration of the opaque medium in cases 1, 7, and 8, and a poor concentration in case 10; cholecystography was not done in the other cases. Barium meal study of the upper gastrointestinal tract was performed in all cases, except case 6, and gave very valuable information. Examination of the entire duodenal loop in the prone or semiprone position is especially recommended for the demonstration of regurgitation of barium into the common duct in patients in whom the sphincter of Oddi is patent.

From an analysis of the literature and experience with their own cases, the authors arrived at the conclusion that gas or barium may be found in the biliary tract in quite a variety of conditions. The two most common of these are regurgitation through the ampulla of Vater and the presence of a biliary fistula. Incontinence of the sphincter is believed to be due most frequently to the passage of stones through it although other causes may also be responsible. The discovery of gas in the biliary tract in cases of intestinal obstruction should arouse the suspicion of gallstone impaction. When gas is found in the biliary tract following a cholecystogastric or cholecystoduodenal anastomosis, there is good reason to believe that the stoma has remained patent.

The presence of gas or barium in the biliary tract may be transitory, or occasionally it may persist for long periods. In one case of the authors' series a patency of the sphincter of Oddi was observed for 4½ years; in another case it was shown only after a small intestinal obstruction developed from an impacted gallstone.—*T. Leucutia, M.D.*

The Diagnostic Value of Hysterosalpingography in Tubal Pregnancy. KRISTINA EKENGREN and ÅKE B. V. RYDÉN. *Acta radiol.*, Stockh., 1954, 41: 247.

HYSTEROSALPINGOGRAPHY, with the use of either iodized oil or water soluble media, has been used in the diagnosis of tubal pregnancy since 1926, and several diagnostic signs have been described in the literature. In a series of 12 cases of surgically proven tubal pregnancy, tubal pregnancy was correctly diagnosed by hysterosalpingography, with use of a water-soluble medium. The findings were correlated with the surgical specimens in which the tubal lumen had been injected with contrast material, and in an additional 8 cases in which preoperative x-ray examinations had not been done, the specimen was examined in this manner.

Water-soluble contrast media are superior to iodized oil because they eliminate artefacts due to the oil having mixed poorly with tubal contents.

In the majority of cases of tubal pregnancy the diagnosis can be made by hysterosalpingography. The opaque material either surrounds the blood mole in the lumen of the oviduct, or spreads diffusely through the intervillous spaces in the partly intact ovum, or through large channels in the blood mole. Uterine atony was not observed in this series.

—*Lois Cowan Collins, M.D.*

Normal Bone, Diseased Bone, Dead Bone. Caldwell Lecture. PAUL C. HODGES. *Am. J. Roentg.*, 1954, 71: 925.

THE AUTHOR reviews the historical developments in the study of bone, beginning with the observation by John B. Belchier, in 1736, that the bones of animals on a special diet became stained, and including the newest concepts of bone physiology and the methods of study of bone pathology.

To explain the different ways in which the physiology of bone is altered in a diseased bone, the author presents the pathological changes seen in three bone diseases—pyogenic osteomyelitis, tertiary syphilis, and osteosarcoma—in each of which the response of the osseous tissue is different. He also mentions the failure to explain at the present time the pathophysiology of some bone diseases such as fibrous dysplasia.

Necrotic bone is dead bone and it is found when the blood supply decreases or stops. The roentgenologic evidence of dead bone is indirect or direct. It is indirect when the bone shows failure to become osteoporotic on disuse; it is direct when the bone shows the characteristic patterns of "creeping substitution" given by a dead bone that has been invaded by blood vessels from the surrounding living tissues.

The term "creeping substitution" was first mentioned by Barth, and later described and studied by Phemister. Phemister studied this phenomenon in bone transplants in which just the periosteum and the medullary contents survived. The surviving osteogenetic cells survive to proliferate and replace the dead bone with new bone. When dead bone is not in contact with living tissues capable of giving it blood supply, it maintains its density indefinitely, as seen in the formation of sequestra of bone.

Three pathologic conditions in which the roentgenologic appearance of dead bone can be detected, and which are therefore of special clinical importance, are: fractures of the femoral neck in adults, aseptic necrosis of the femoral head in children, and subchondral necrosis involving the fractured carpal scaphoid.

The process of "creeping substitution" is accompanied by softening of the osseous tissue in which it is taking place; therefore it is very important that the affected bone have a sufficient rest period to prevent the development of necrosis in bone that still does not contain the proper blood supply.

—*Adan Pitol, M.D.*

Irradiation Therapy in Hodgkin's Disease. CHARLES M. NICE and K. WILHELM STENSTROM. *Radiology*, 1954, 62: 641.

ALTHOUGH the lesions of Hodgkin's disease appear radiosensitive, the mortality rate is high. A series of 208 patients with proved Hodgkin's disease showed a 5-year survival rate of 25 per cent. Of these, 167 patients were followed 10 years or longer and the 10-year survival rate was 11 per cent. Clinical staging is the most accurate aid in prognosis and is necessary in comparing series from various medical centers.

In stage I (involvement of a single lymph node region or a single lesion elsewhere in the body), the treatment of choice is either intensive irradiation, or, possibly, surgical excision followed immediately by intensive irradiation. For 20 stage I cases, the 5-year survival rate was 85 per cent; and for 13 of these, the 10-year survival rate was 77 per cent.

In stage II (involvement of two or more proximal lymph node regions of either the upper or lower trunk), intensive radiation is the treatment of choice. Of 20 stage II patients, the 5-year survival rate was 90 per cent; and of 17 stage II patients, the 10-year survival rate was 30 per cent.

In stage III (involvement of two or more lymph node regions of both the upper and lower trunk), palliative irradiation to reduce tumor masses or relieve symptoms is indicated. In this group nitrogen mustards and triethylene melamine may serve as useful adjuncts. The 5 and 10 year survival rates are 10 and 2 per cent, respectively.

—*Lois Cowan Collins, M.D.*

Roentgen Therapy for Cancer of the Larynx and Laryngopharynx. Twenty Years' Experience. WILLIAM HARRIS, SIDNEY M. SILVERSTONE, and RUDOLPH KRAMER. *Am. J. Roentg.*, 1954, 71: 813.

THE AUTHORS have used roentgen therapy as the method of choice for the treatment of cancer of the larynx and laryngopharynx at the Mount Sinai Hospital in New York City since 1931. Up to 1951 (a period of 20 years) 220 patients were treated, and the authors present a detailed account of their experience.

The cases have been classified into two major groups and several subgroups.

The ratio of males to females was 9:1; three-fifths of all patients belonged to the age group of 50 to 69 years.

The technique of roentgen therapy from 1931 to June, 1947, which period includes the 5 year results, was as follows: 200 Kv. peak, Thoraeus filter, a half-value layer of 1.9 mm. copper, 60 cm. focal skin distance, two contralateral fields of 20–70 c.c., and a tumor dose of 4,700 to 6,000 roentgens (estimated in the center of the larynx) delivered in a period of from 28 to 40 days.

TABLE I.—CANCER OF THE LARYNX AND LARYNGOPHARYNX TREATED BY ROENTGEN IRRADIATION, 1931–1951

Total number of cases treated	220
Intrinsic	117
Originally suitable for cordectomy (laryngofissure)	31
Originally would require laryngectomy	86
Extrinsic (laryngopharynx)	103
Anterior lesions (epiglottis, false cord)	46
Posterolateral lesions (arytenoid, aryepiglottic fold, pyriform sinus, postcricoid)	35
Extensive lesions (both anterior and posterolateral locations)	22

TABLE II.—CANCER OF LARYNX AND LARYNGOPHARYNX, 1931-JUNE, 1947

5 year results of treatment with roentgen rays, all cases—unclassified

Cases treated	139
Indeterminate cases	25
Cases followed	114
Number of 5 year cures	67
Determinate 5 year cure rate	59 per cent
Absolute 5 year cure rate	48 per cent

TABLE III.—CANCER OF LARYNX AND LARYNGOPHARYNX, 1931–1951

Total number of cases treated by roentgen rays	220
POSTIRRADIATION SURGERY	
Total laryngectomies	27
Hemilaryngectomy	1
Cordectomy by laryngofissure	5
Excision of epiglottis	2
Neck dissection (combined with laryngectomy in 3)	8
Plastic repair	1

The 5 year results obtained with this technique in 139 cases, from 1931 to June, 1947, are shown in Table II.

In view of the large number of indeterminate cases, as shown in Table II, the 5 year absolute survival rates were appreciably lower. More than half of the patients in the indeterminate group were over 70 years of age.

Infiltration, as indicated by fixation of one or both sides of the larynx, and obstruction, necessitating tracheotomy before or during therapy, were complications leading to lower survival rates in the respective subgroups. No statistical evaluation of the significance of cervical lymph node metastases was made because of lack of histopathologic proof.

The 10 year survival rates were similar to those at 5 years. Most of the recurrences developed within the first 2 years.

Following failure of roentgen irradiation, surgery was undertaken in 44 cases of the entire series of 220 cases. The types of operations performed are shown in Table III.

The outcome of the operation was successful in certain instances. These are discussed.

The general conclusion is reached that roentgen therapy and surgery are practically of the same value in treating cancer of the larynx and that, therefore, irradiation should be the method of choice over surgery where it is a matter of preservation of the larynx.

—*T. Leucutia, M.D.*

RADIUM

Treatment of Carcinoma of the Thyroid. FOLKE JACOBSSON. *Acta radiol.*, Stockh., 1954, 41: 169.

THE VALUE and indications for radiotherapy in thyroid cancer have been uncertain because of the difficulty in delivering an adequate dose to affect the tumor, and because of the very slow course of the dis-

ease. Poorly differentiated types are often radiosensitive but the patient dies of metastases within a year.

At Radiumhemmet from 1935 to 1946, 144 consecutive cases of thyroid carcinoma were treated with irradiation either as supplementary therapy in operable cases, or as the sole method of treatment in inoperable cases. Two-thirds of the patients were between 40 and 70 years of age. The two youngest patients were aged 19 years, although the histories in some cases suggest onset of the disease in early childhood.

The material was divided into four stages according to the extent of the disease at the time of treatment, and into six groups according to histologic differentiation. If the primary tumor is mobile or only slightly fixed to adjacent structures, and if metastases are limited to mobile lymph nodes on one side of the neck, hemithyroidectomy and postoperative teleradium treatment are advised. Seventy-five per cent of the cases were inoperable, and for this group teleradium is the treatment of choice with a tumor dose of 6,000 roentgens in a period of 3 to 4 weeks. Only 1 patient in this series was treated with radioactive iodine.

The results of treatment in cancer of the thyroid depend upon the stage of the disease and the histologic type of tumor. For the operable patients a 5-year survival rate of 95 per cent was obtained; for inoperable cases without distant metastases the 5-year survival rate was 35 per cent.

In 60 per cent of the patients of this series, the presence of goiter for more than 1 year had been observed. The author suggests that thyroid cancer might be a preventable disease; surgical removal of nodular goiter would be prophylaxis against carcinomatous degeneration in some adenomas, and certain cases of early malignancy would be detected.

—Lois Cowan Collins, M.D.

MISCELLANEOUS

Experimental Radiotherapy of Abdominal Cancer; Radiosensitivity of Liver Tumors. L. COHEN, M. P. SHAPIRO, P. KEEN, A. COHEN, and N. G. DEMOORE. *Brit. J. Radiol.*, 1954, 27: 402.

THE TYPE of primary hepatic cancer seen in the African may extensively involve the liver. It resembles chemically-induced experimental rat hepatoma in its pathogenesis, response to radiation, complications, and histologic features before and after treatment. The probability of a similar etiology is suggested. Radiotherapy offers the only possible palliation. With tumor doses of the order of 3,000 roentgens in 2 weeks, both human and animal hepatomas undergo rapid regression. Although normal liver is not unduly radiosensitive, treatment is complicated by severe systemic effects of radiation of the abdomen. Premedication with flavonoids (rutin), or field-fractionation with grids or protective measures which reduce the intensity of skin reaction, renders radiotherapy of cancer of the liver a practicable procedure. The possibility of cure, however, is considered remote in view of the replacement of almost all normal liver tissue by tumor.

—Lois Cowan Collins, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Sylvest's Disease (Bornholm Disease). WILLIAM N. PICKLES. *N. England J. M.*, 1954, 250: 1033.

AN INFECTIOUS disease caused by group B Coxsackie virus strain is a nonfatal disease of epidemic type associated with pleurodynia. Other speculative names for this short nonfatal infectious disease are epidemic myalgia, epidemic pleurodynia, and epidemic benign dry pleurisy.

The symptoms of this syndrome are an abrupt onset of acute spasmodic pain in the upper abdomen, accompanied by profuse sweating. There is usually rapid, shallow breathing, obviously extremely painful, and pain on yawning, deep breathing, and laughing. This pain occurs between spasms. The temperature may rise to 103° F., rapidly subsiding but tending to rise again about the third day and again on the fifth or sixth day. There is complete absence of vomiting; the tongue is usually coated; there is no faucial infection; however, nasal catarrh and unilateral conjunctivitis have been noted, but may be incidental; there are no rashes. There is complete recovery in 4 to 6 days.

The largest known epidemic of pleurodynia of this type occurred in Sweden in 1931, when 12,000 cases occurred during the late summer. This innocuous illness with no death rate is remarkably successful as a mimic of serious disease both abdominal and thoracic, and unless the syndrome is very clearly observed and defined many of these sufferers may find themselves on an operating table for exploration. It is interesting to note that group A strains of this virus are not implicated. —*John E. Karabin, M.D.*

Parenteral Administration of Fats. SMITH FREEMAN. *Q. Bull. Northwest. Univ. M. School*, 1954, 28: 113.

THE AUTHOR presents a history of the development of parenteral fats. Throughout the article extensive documentation is used, and a complete bibliography is appended. Problems germane to parenteral fat administration are lucidly presented.

Attempts have been made to provide a fat solution which is similar to that normally found in the blood, and this requires fat to be in a highly dispersed state. In trying to disperse fat into a watery medium many factors must be considered; e.g., specific gravity, charge, and the dispersing medium. The end result is an emulsion. The emulsion should have a high degree of stability; it should be stable when exposed to heat, electrolytes, and storage. Because of high interfacial tensions in fat emulsions, stability is achieved by using surface active agents. Lecithin has been used in a 1 or 2 per cent concentration; however, this type of substance is somewhat unstable. Albumin will stabilize fat emulsions, as will gelatin. Extrusion of fats through a small opening, and supersonic vibrations have also been used to emulsify fats. Fairly stable emulsions have been developed, but they have not been nontoxic to animals.

There are many nonspecific and general reactions to the administration of fats: headache, dizziness, precordial pain, blood pressure fluctuations, chills, nausea, etc. The most constant reaction is an increased temperature response. Some of the reactions can be controlled by antihistaminics. Among 1,000 infusions, there was a 12.7 per cent incidence of reactions. In one series of patients an increased temperature of about 2 degrees developed in 87 per cent of patients. The explanations for this are many. Some authors ascribe it to pyrogens, others to the emulsifying agent. The rate of clearance from the blood has been considered. Heparin causes a faster removal of fats from the blood, but its administration did not cause a greater thermogenic response. A sudden release of metabolic heat has been suggested.

Dogs partially maintained on emulsified parenteral fats developed a normocytic anemia. There was no evidence of histologic changes in any of the organs. Several authors ascribed the cause of the anemia to intravascular hemolysis by the emulsifying agents. The reaction of patients to fat emulsions is unpredictable. The same patient may react differently on successive days to the same emulsion. Different disease states apparently modify the patient's reaction. Postmortem studies fail to reveal an accumulation of infused fat. Experimentally, it has been shown to collect in the wall of the aorta.

Some fat emulsions were found to accumulate in the liver. Fat has been found in the reticuloendothelial system, and in the lungs. The injection of normal chyle was not followed by a collection of fat in any particular organ. The more unstable the emulsion, the more likely that it would be liable to collect in an organ.

There is positive evidence that injected fat is utilized. Shortly after the injection of a fat emulsion there is a lowering of the respiratory ratio. The life of starved dogs can be prolonged by parenteral administration of fats. Weight can be maintained in dogs on an inadequate calorigenic diet. With the use of radioactive carbon it can be shown that most of the substance is recovered in the expired air in 4.5 hours. The increase in blood ketones several hours after parenteral fat administration is further evidence of metabolic utilization of fat.

The clinical use of parenteral fats has not been extensively employed. There is not much doubt of its value in the chronically depleted patient. Body weight has been maintained over a period of 12 to 21 days with the use of a liter of 15 per cent fat emulsion daily.

Oral fat will spare protein, but there is little evidence that parenteral fat will do the same. Emulsified fats may have value as a vehicle for fat-soluble substances naturally occurring in the blood. The peak of the lipemic curve occurs 4 to 6 hours after ingestion, and may remain thus for 12 hours. There is usually a lag of several hours before fat is found in the thoracic duct, in the form of neutral fat.

The infusion of fat does not stimulate normal body processes as does an infusion of glucose. In the latter instance the products of the pancreas help utilize the sugar. Most organs apparently can use amino acids without great difficulty, but fats, as with other colloidal substances, may be sequestrated in the reticuloendothelial system.

—*Richard L. Lawton, M.D.*

Systemic Disease and the Carpal Tunnel Syndrome. ALBERT W. GROKOEST and FELIX E. DEMARTINI. *J. Am. M. Ass.*, 1954, 154: 635.

COMPRESSION of the median nerve in the volar carpal tunnel (the carpal tunnel syndrome) has been described in association with rheumatoid arthritis, and as due to trauma of unknown etiology. The present report deals with 5 cases in which bilateral median neuritis developed as the first manifestation of amyloid disease (primary and secondary) and 1 clearly defined case occurring in a patient who had developed rheumatoid arthritis.

Three case histories are included in the report. One patient developed plasma cell myeloma, the first evidence of which was the appearance of the carpal tunnel syndrome. The second patient apparently had primary amyloidosis and the initial symptomatology was associated solely with the carpal tunnel syndrome. The third patient had rheumatoid arthritis and subsequently developed symptoms of the carpal tunnel syndrome. Following exploration of the carpal tunnel and severance of the transverse carpal ligament in the second and third instances, the symptoms of numbness, edema, and inflammatory contractures of the finger disappeared.

Special histologic technique for the demonstration of amyloid in the surgical specimens removed from the carpal tunnel is considered important as an aid to diagnosis of the etiologic factor.

—*Jerry A. Stirman, M.D.*

Raynaud's Phenomenon Due to Vibrating Tools; Neurological Observations. JOHN MARSHALL, E. W. POOLE, and W. A. REYNARD. *Lancet*, Lond., 1954, 1: 1151.

RAYNAUD'S phenomenon has been defined as intermittent pallor or cyanosis of the extremities, precipitated by exposure to cold, without clinical evidence of blockage of the large peripheral vessels and with nutritional lesions, if present at all, limited to the skin.

There are two schools of thought regarding its causation. One group believes it is due to a local fault in the walls of the digital arteries; the other group considers overactivity of the vasomotor nerves to be the cause.

The authors present a series comprising 37 men with traumatic Raynaud's phenomenon due to the use of vibrating tools. There was evidence of persisting nerve damage in many of these men: motor weakness, sensory loss, and the development of premature numbness in response to ischemia produced by cuffs and nerve clamps.

Damage to the peripheral nerves may be responsible not only for the neurological deficits but also for the vasospasm of the attacks.

—*Ely Elliott Lazarus, M.D.*

Polyvinyl and Silicone Compounds as Subcutaneous Prostheses; Laboratory and Clinical Investigation. JAMES BARRETT BROWN, MINOT P. FRYER, and MILTON LU. *Arch. Surg.*, 1954, 68: 744.

PERMANENT, nontumor-forming, subcutaneous prostheses are a great need in plastic surgery, and it is hoped that these new compounds may be investigated and developed to supply the need

It has been found in laboratory animals, and clinically, that a foamed polyvinyl alcohol sponge might be a satisfactory subcutaneous prosthesis for use just under the skin, presumably without tumor formation, but tumors or breakdown might occur later in clinical use, then observed in laboratory animals, and further investigation is needed before a final decision can be made. Implanting large amounts of this material to fill out breast contour, as reported in a popular magazine, has resulted in a great deal of trouble in several instances, according to reports from physicians doing follow-up care on these patients.

Success in plastic surgery will depend on the availability of an adequate pocket to receive the transplant and permanent healing over it; here again, as has been repeatedly noted, the deep healing can do no better than the surface healing, and in the instance of an unsuccessful subcutaneous prosthesis the surface healing, contour, and resiliency can do no better than the deep healing.

—*John J. Maloney, M.D.*

Glomus Tumor. E. S. J. KING. *Austral. N. Zealand J. Surg.*, 1954, 23: 280.

THE AUTHOR presents a review of glomus tumor, based on a study of the literature and on the investigation of 28 new patients.

Although distributed mainly in the dermis and subcutaneous tissues, glomera may occur also in the muscles, tendons, bone, and in the deeper parts of the body; and though they are usually found singly, they may also be multiple. They occur in males more commonly than in females.

These tumors are not neoplasms, but malformations (hamartomas) of a characteristic structure, being composed of a network of vessels in all of which there are characteristic "epithelioid" or "glomus" cells. Smooth muscle, fibrous tissue, and nerve tissue may occur in considerable amounts and occasionally may predominate. The tumors thus are seen to merge imperceptibly into vascular or muscle tumors of the skin and subcutaneous tissues. This may be correlated with the observation that some of these other types of tumor may show the characteristic clinical syndrome of severe pain, either the local or radiating type. Although this observation is important as indicating the lack of sharp boundaries so characteristic of many pathological conditions and, in fact, of life, the typical tumor is a very characteristic structure.

The only treatment available is ablation of the nodule. Attempts have been made to deal with the pain by sympathectomy, but without success. X-ray treatment of the nodule has been similarly ineffective. On the other hand, complete removal of the nodule has been uniformly successful, and since the nodule is well circumscribed this does not present difficulty.

—*Edmund R. Donoghue, M.D.*

Malignant Carcinoid of the Small Intestine with Metastases to the Liver, Valvular Disease of the Right Side of the Heart (Pulmonary Stenosis and Tricuspid Regurgitation Without Septal Defects), Peripheral Vasomotor Symptoms, Bronchoconstriction, and an Unusual Type of Cyanosis. A Clinical and Pathologic Syndrome. AKE THORSON, GUNNAR BIÖRCK, GUNNAR BJÖRKMAN, and JAN WALDENSTRÖM. *Am. Heart J.*, 1954, 47: 795.

THE AUTHORS describe a new clinical syndrome, based upon their observations in 16 cases, in 7 of which there were definitive correlative signs and symptoms; in 4 cases the symptoms were of "probable" nature, and in 5 cases there were partial or not fully verified symptoms.

The syndrome consists of a malignant carcinoid of the small intestine with metastases to the liver and to other intra-abdominal organs, pulmonary stenosis of the valvular type, with tricuspid regurgitation without septal defects, plethoric coloration, and partial or total cyanosis in the absence of polycythemia, with a peculiar patchy flushing of the skin, attacks of atypical "bronchial asthma," edema, and ascites.

A common denominator to explain the pathogenesis and clinical manifestations of this syndrome is thought to be found by the authors in the hormonal properties of the malignant carcinoid of the small intestine and its extensive metastases.

Among those substances with vasoactive properties (at present known) is one which has been extracted from enterochromaffin tissue and chemically identified as an indole derivative (5-hydroxytryptamine). Secretion of large amounts of 5-hydroxytryptamine may (not least at a time when liver damage may be present) induce functional changes in the vascular bed, both peripheral and pulmonary, which, if sustained for a period of years, may give rise also to organic alterations such as telangiectasis, nutritional disorders of the skin, and apparently also valvular lesions of the heart.

The syndrome is apparently rare, but if patients with the characteristic cutaneous symptom of bright to deep purple "flush" of transient character are properly investigated, more cases may be discovered.

—Earl W. Cauldwell, M.D.

Experimental Work with Reference to Syncarcinogenesis by Means of the Combined Effects of a Specific Cancer Noxa—2-Acetylaminofluorine—and a Noxal Factor (Cholin-Deficiency Diet) Which is Not Specific for Cancer Genesis (Ueber Versuche zur gelenkten Krebserzeugung durch Zusammenwirken einer spezifischen Krebsnoxe—2-Acetylaminofluoren—und einer nichtkrebsspezifischen Schaedigung—Cholinmangelernaehrung). HANS LAU and PAUL BAIER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 156.

THE TERM syncarcinogenesis comes from the proposal of K. H. Bauer in 1948 that all components of the designation should be of Greek origin; Shear, in 1938, had spoken of the process as one of "co-carcinogenesis."

Eighty white rats, which had been bred and selected in the authors' laboratory were placed on a cholin-free diet for 5 days. Then for 25 weeks they were put on a regular diet with the addition of 0.05 per cent of 2-acetylaminofluorine (2-AAF). The cholin-free diet consisted of 2-AAF (0.05 per cent, arachus oil (12.0 per cent), gelatine (6.0 per cent), casein (3.0 per cent), fibrin (1.0 per cent), and carbohydrates (to 100.0 per cent).

On the whole, no effect could be determined regarding the incidence of tumor development in this material which could be ascribed to a process of syncarcinogenesis.

Various factors are considered in an attempt to explain this lack of results. If, as Bielschowsky avers, the increase in the incidence of tumor development is not noted before the tenth experimental month, then only 22 of the authors' animals reached the cancerogenic manifestation period. In these 22 animals the incidence of tumor was not greater than the general rate of cancer development for these animals, and the other changes (liver and kidney damage) were not more pronounced than those reported by Bielschowsky following the administration of 2-AAF alone. In any event, under the experimental conditions reported, none of the changes observed could be interpreted as precancerous in character.

The early fatty degeneration of the liver was no longer observed in the animals which were held for lengthy periods under the experimental conditions described, and this may be explained by the fact that the fat stored during the cholin-free period was later removed by the lipotropic substances gaining admittance to the organism, that is, the fatty involvement was a reversible process.

Thus, it is evident that the question of race must be further investigated in these animals if any results are to be expected in the syncarcinogenic sense, and the conditions of the experiment must be varied.

—John W. Brennan, M.D.

The Development of Malignant Melanoma in Both Recipient and Donor Sites of an Autogenous Skin Graft. H. A. S. VAN DEN BRENK. *Austral. N. Zealand J. Surg.*, 1954, 23: 313.

A CASE is here recorded in which an autogenous skin graft was followed by simultaneous development of a malignant melanoma in both the donor and recipient sites. A review of the literature failed to reveal any similar case. There was no visible melanoma in the donor area. The author discusses some aspects of this case with reference to a possible bearing on tumor genesis. *—Edmund R. Donoghue, M.D.*

Cancer; the Newest Management in Theory and Practice; the Problem of Metastasis (Krebs; der neueste Stand der Forschung in Theorie und Praxis; Ueber Metastasenprobleme). KARL KATZ. *Medizinische*, 1954, p. 669.

THE AUTHOR gives a historical review and a resumé of current ideas as well as some practical pointers resulting from better understanding due to theoretical research and recent clinical observation. Virchow's humoral theory and concept of dyscrasia have to be considered as obsolete at this time. Thiersch and Waldeyer's concept of cell migration appears to be on firm ground. Facts responsible for the disjunction of cells

from a primary tumor are not completely known. Some experimental findings of Kellner in Budapest are enumerated. One fact emerges: the formation of metastasis is a function of the primary tumor—some of them tend to metastasize and some of them do not. Metastases can spread through the lymphatics or the blood stream. The routes of spread are enumerated—through the lungs, the liver, the vena cava, the portal vein, and the thoracic duct.

A complete analysis is given and schematic pictures illustrate the text. A thorough interpretation of retrograde metastasization and intermediate metastasis formation is given and treated in the light of the modern experimental concept. Not all metastatic colonies develop into secondary malignancies. Some of them die. The virulence of the cancer and disposition of the organism are important factors.

Metastases are morphological manifestations of a pre-existent relationship between the primary tumor and the organism. We do not know their causes at the present time; our knowledge is limited to enumeration of the possibilities only. Certain organs are preferred by metastases. There are pathophysiological reciprocal relationships, such as the removal of a malignant struma which causes thyroprival and parathyroprival syndromes, a growing metastasis which replaces the physiologic functions of the removed organs and causes the deficiency symptoms to recede (Sauer and Von Eiselsberg).

The behavior of malignant cells in tissue cultures is described. The theory and value of Abderhalden's reaction are discussed. Early and late metastasization is described and it is pointed out that no conclusion as to the degree of malignancy can be drawn from the pattern of behavior. Although it is known that malignant cells separate spontaneously from primary tumors, caution should be exercised when performing biopsies. Surgery may break through a "premetastatic stage of protective defense." (Praemetastatische Abwehrlage).

From a practical standpoint, radical surgery for removal of pulmonary metastasis is justified, provided the primary tumor is removed radically and no other secondary cancer colonies are found. Hypernephroma, mammary cancer, neurogenic sarcoma, and fibrosarcoma of the fibula are given as examples of cases with cures followed by from 7 to 18 years of healthy life, according to W. Denk in Vienna.—*Otto Weiss, M.D.*

EXPERIMENTAL SURGERY

Suprarenal Changes Under Artificial Hibernation in Instances of Burn Shock. Research on Experimental Animals (Nebennierenveraenderungen unter kuenstlichem Winterschlaf im Verbrennungsschock Tierexperimentelle Untersuchung). SATURO KUWABARA. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 61.

FIFTEEN fasting rats were given intramuscular injections of 2 to 4 mgm. of the so-called lytic cocktail of Laborit per kgm. of body weight. The mixture contained megaphen or N-(3′-dimethylamino)-propyl-3-chlorphenothiasin, dolatin (the hydrochlorid of the ethylester of 1-methyl-4-phenylpoperidin-4-carboxylacid), and atosil (the hydrochloric acid salt of N-2′-dimethylamino - 2′ - methyl - ethyl)— phenothiazinthorazine of Smith, Klein, and French). A second dose of 1 mgm. was given a half hour later. After another half hour a third of the skin of the back of the lightly anesthetized animal was subjected for 10 seconds to immersion in boiling water. After this the hibernation, with the supplemental application of ice bags, was continued. The ice bag treatment was given only to animals with a rectal temperature higher than 30 degrees C. Five hours later the animals were sacrificed by ether inhalation and the suprarenal glands were removed and fixed in 10 per cent formol solution. A group of 15 control rats were treated in the identical manner without, however, the administration of the lytic cocktail and the ice bags.

The histological study of the removed suprarenal glands gave the following results: in the glomerular layer of the control animals the rounded, lightly staining nuclei were extremely rare (less than 10 per cent), while the dark-staining nuclei predominated, and in the hibernated animals the typical light-staining nuclei were more numerous than in the control animals (about 15 per cent).

In the peripheral area of the fasciculi of the control animals the rounded light-staining nuclei were extremely rare (about 5 per cent) and smaller in size than in the normal animal (normal animals 103 μ^2 control animals 91μ^2); the dark-staining nuclei predominated. In the hibernated animals the typical light-staining nuclei were much more frequently encountered (in about 20 per cent) and they were larger than in the normal animal (normal animal 103μ^2, hibernated animals 147μ^2). Karyokinesis was not so frequently present as in the control animals.

In the central area of the fasciculi of the control animals the typical light-staining nuclei were very rare (about 5 per cent). The remaining nuclei were dark-staining, small, and with irregular borders. In the hibernated animals the typical light-staining nuclei were very much more numerous (44 per cent); the remaining nuclei were smaller and fewer in number than in the control animals. The nuclear borders were smoother.

In the reticularis of the control animals the typical light-staining nuclei were extremely rare (in about 20 per cent); the remaining nuclei were irregular, serrated, and dark-staining. In the hibernated animals the light-staining nuclei comprised about 60 per cent; the remaining nuclei were generally small, but they had smooth borders. In the medulla of both the control and hibernated animals the typical light-staining nuclei comprised 45 per cent; the remaining nuclei were small and exhibited frequent karyokinesis.

Neither the interstitial tissue of the medulla nor the ganglion cells of the sympathicus showed changes in any of these groups.

The author concludes from his observation of the animals themselves and their organs that burn shock may be produced by a number of different factors and that artificial hibernation is effective therapy for the nervous component of this condition. In the burned animals under hibernation the capillary blood supply to the suprarenal glands was decreased, the number of light-staining nuclei in the cortex of the organ was

greater, and the evidence of karyokinesis was less evident than in the control animals.

From these findings it is concluded that artificial hibernation is effective in preventing the damage (and exhaustion) of the suprarenal glands resulting from the neurogenic component of shock. Finally, it is maintained that the helpful portion of the treatment is the ganglioplegic effect of the lytic cocktail, and that a too vigorous application of the ice bags is apt to be harmful rather than helpful. In no instance was the body temperature of these animals intentionally lowered to below 30 degrees C.

—*John W. Brennan, M.D.*

HOSPITALS; MEDICAL EDUCATION AND HISTORY

Golden Jubilee of "The Antiseptic." *Antiseptic,* Madras, 1954, 51: No. 4.

THE COMPLETION of 50 years of medical publication by *The Antiseptic* is marked by an anniversary issue of historic material dealing with advances and progress in the entire field of medicine since the establishment of the journal in 1904. *The Antiseptic* occupies a unique spot in medical publications in that it has entered not only into the field of medical journalism, but into all phases of medical practice. It has fought for the unification of Indian medical practice and for many other innovations and reforms. It has become an institution rather than simply a journal, and has taken an active and forceful part in all of Indian medicine. It has indeed fulfilled the ideals of its founders, Dr. U. Rama Rau and Dr. T. M. Nair.

To review the contents of the anniversary issue would be tantamount to reviewing the whole of modern medical, surgical, gynecologic, and public health medicine. It would be invidious to select any single one of the 58 original articles for separate mention. Suffice it to say these represent only about one-quarter of the contributions received by the journal on this occasion and that readers will receive a veritable wealth of worth-while material during the succeeding months. This issue and the succeeding ones will give the reader an encompassing picture of medicine today. —*Michael L. Mason, M.D.*